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ABSTRACT

This guide is designed to help teachers and administrators in higher education who are responsible for developing courses and other instructional products to become more aware of current research and thinking on systematic instructional development. Taken together, the five modules of the guide present a model for planning instruction and offer a set of activities to explore how this process can be adapted to both the academic and corporate environments. Each module of the guide focuses on a particular facet of systematic instructional development, and provides practical suggestions for addressing institutional requirements and learner needs in each step of the process. The basic phases of the process provide the overall structure for the guide. Where issues are considered controversial, opposing points of view have been included. In some modules articles have been included at the end to provide additional depth. The titles of the five modules are as follows: (1) "A systematic Approach to Instructional Development"; (2) "Assessing the Needs of Learners"; (3) "Formulating Objectives that Encourage Achievement"; (4) "Assessing the Outcomes of Instruction"; and (5) "Designing Activities that Facilitate Learning." An index and reference list of 76 resources are provided. (JB)

ED348912

STRATEGIES FOR INSTRUCTIONAL DEVELOPMENT

A Resource and Planning Guide

HE 025 733

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- increase awareness of the work of the CSU Institute for Teaching and Learning;
- increase access to the work of CSU/ITL affiliates;
- begin to build a subset of information on teaching and learning that supports *The National Teaching and Learning Forum (NTLF)*, ERIC/HE's newsletter;
- encourage use of the ERIC system by CSU/ITL member affiliates and the *NTLF* readership; and
- test a model for collaboration between ERIC/HE and a major higher education system.

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Overview

Background

As an educator and learner with a great deal of prior experience with developing and delivering courses, you can no doubt identify instances when instructional planning seemed either absent or inadequate. The results of poor planning frequently take the form of one or more of the following problems:

- Critical content is omitted.
- Content is based on instructor interests rather than program needs.
- There is no clear definition of what should be learned.
- Instructional methods and media are selected arbitrarily or by default.
- Testing is oriented to content familiarity rather than the achievement of specified learning outcomes.
- There is a general lack of correspondence between the instructional program goals, the instructional materials, and the tests.
- Instructional design and development efforts tend to be inefficient in terms of personnel used and the roles in which they are used.
- Little attention is given to assessing the effectiveness of the instructional program or to providing a means of keeping it current.

Goal

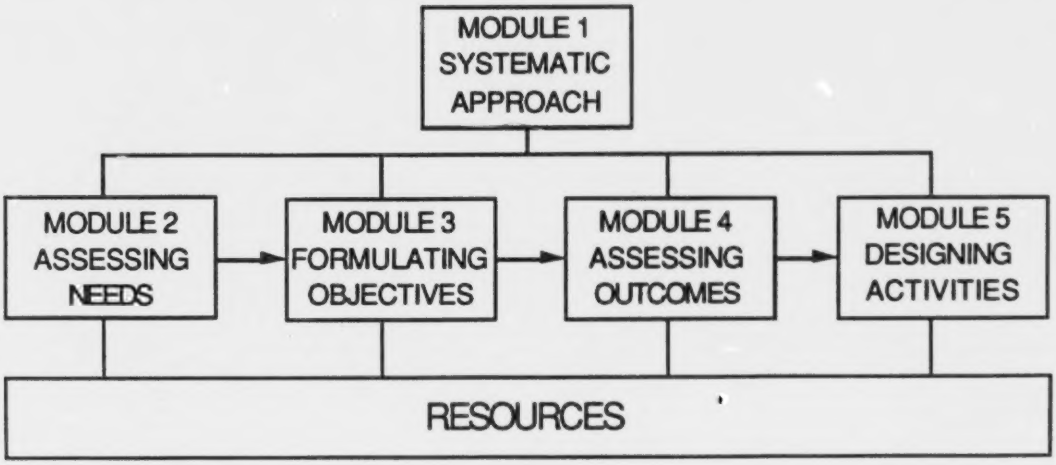
How can you ensure that the instruction you develop is a high quality product? That learning outcomes are consistent with program goals and student needs? Quite simply, by investing sufficient time and thought in its planning. The plan may not always be committed to paper, but it should certainly reflect your best estimate of what it will take to achieve the desired results. In this *Guide*, you will examine a model which has been used extensively to plan instruction and explore how this same model can be adapted to both the academic and corporate environments.

Purpose

This *Resource and Planning Guide* has been developed to help you, as an educator, become more aware of current research and thinking on the subject of systematic instructional development and more actively apply this model in your own practice setting. The *Guide* is intended for use by faculty and trainers who are responsible for developing courses and/or other kinds of instructional products.

Organization

Each module focuses on a particular facet of systematic instructional development, and provides practical suggestions for addressing institutional requirements and learner needs in each step of the process. The basic phases of this process provide the overall structure for the *Guide*. (See figure next page.)


MODULE 1
SYSTEMATIC
APPROACH
MODULE 2
ASSESSING
NEEDS
MODULE 3
FORMULATING
OBJECTIVES
MODULE 4
ASSESSING
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MODULE 5
DESIGNING
ACTIVITIES
RESOURCES

In cases where the issues presented are considered controversial, opposing points of view have been included to help you draw your own conclusions. In some cases, articles have been included at the end of a module to provide additional depth. An extensive list of resources has also been included at the end of this *Guide* to help you further explore selected topics of interest.

Approach

The *Guide* may be used for self-paced independent study or as a reference tool. No external resources are required. Questions have been integrated with the concepts and readings to stimulate thinking, relate new knowledge to prior experience, and encourage its application in the practice setting. There is no answer key, as your responses will be individually determined by personal experience and need.

Module 1

A Systematic Approach to Instructional Development

–Assumptions about Instructional Systems Development
–Steps of the ISD Model
–Integrating Instructional Theory with Instructional Design
–References
–Reprints

1

A Systematic Approach to Instructional Development

Preview

Instructional Systems Development (ISD) is a systematic approach to designing, producing, evaluating, and maintaining instructional programs. It consists of a series of logically sequenced and interrelated steps and procedures derived from the fields of educational psychology, instructional technology, and systems engineering. In this module, you will examine this model in some detail and evaluate its usefulness in guiding instructional development in your own practice setting.

Goals

In this module, you are invited to:

- Examine one widely-used model for systematic instructional development, including its supportive assumptions and component steps
- Compare and contrast your own approach to instructional planning with the one embodied in the ISD model
- Explore the adaptability of the ISD model to different instructional settings
- Integrate your own theoretical orientation to learning with the process of instructional systems design

Assumptions About Instructional Systems Development

Purpose

Instructional Systems Development was originally developed to facilitate learning and to make recurrent instructional programs more efficient. The model is based on the following assumptions regarding the nature of learning and what constitutes effective instruction.

- The content of an instructional program should be relevant to the performance requirements of the position or functions for which the course is preparing the learner.
- A good instructional program should be efficient in terms of accomplishing its goals with a minimum of instructional resources (time, money, staff, facilities).
- The most effective instructional programs are those which are based on explicit learning outcomes or objectives.
- Selection of any instructional strategy or medium should be based on learner characteristics and situational factors, and address the varying needs of a diverse learner population.
- A good instructional system should provide for empirical testing of the instruction, followed by revision or modification of those areas shown to be ineffective or irrelevant.
- There is a clear distinction between instructional content and instructional process.
- The applicability of the ISD approach does not depend on subject matter, the length of the instructional program, or the complexity of the learning involved.

Key Issues

Although few would dispute the value of systematic instructional planning, there is a significant gap between what ISD can offer and what is actually implemented in the classroom. In his studies of teaching practice, both in the public schools and institutions of higher learning, Snelbecker (1987) found that the following common problems emerged:

- Many instructors do not recognize how instructional design information and techniques actually differ from their current practices.
- They do not recognize how the information and techniques can be made functionally relevant to their routine activities.
- They tend not to differentiate between curricular and instructional issues, and need help in integrating content and method.
- Many instructors overestimate their knowledge of instructional design theories and techniques.
- They assume that adoption of ISD practices will require them to abandon all of their current methods.
- Some discount instructional design information because it was developed in a different context.
- Many instructors feel they do not have the time to plan instruction.
- They feel that instructional design is relevant to only a narrow range of instruction (i.e., AV or computers).

Questions

Would you agree with the perception that teachers are at least part-time instructional designers? Why or why not? How important is this role in your practice?

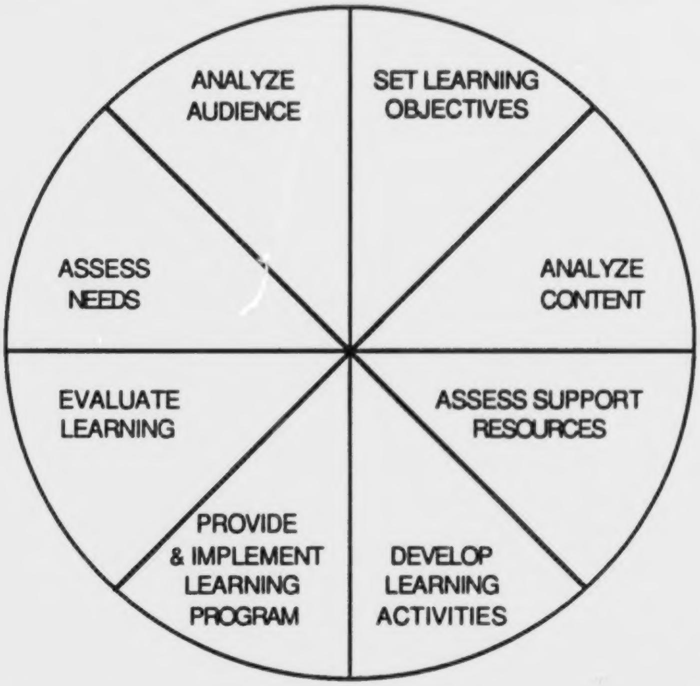
Steps of the ISD Model

Description

Although there are numerous variations on the systems model of instructional development, they are all similar in that they strive to answer three basic questions (Kemp, 1977, p. 8):

1. *What must be learned? (objectives)*
2. *What procedures and resources will work best to reach the desired learning levels? (activities and resources)*
3. *How will we know when the required learning has taken place? (evaluation)*

The answers to these three basic questions constitute the instructional plan. In the academic setting, such a plan typically consists of the following components:


ANALYZE AUDIENCE
SET LEARNING OBJECTIVES
ASSESS NEEDS
ANALYZE CONTENT
EVALUATE LEARNING
ASSESS SUPPORT RESOURCES
PROVIDE & IMPLEMENT LEARNING PROGRAM
DEVELOP LEARNING ACTIVITIES

Adapted from Kemp, J. E. (1971). *Instructional design: A plan for unit and course development*. Belmont, CA: Fearon.

Article

The following article describes a similar model for instructional development as it is typically applied in the corporate and industrial training setting. Read the article, which is reprinted at the end of this module. Then return to this page and answer the questions that follow.

Rosenberg, M. J. (1982, September). The ABC's of ISD. *Training and Development Journal.*

Question

Which of the forces that led to adoption of the ISD model in the corporate setting are present in your instructional setting?

Questions

Do you currently use a systematic approach to course development? If so, how does the process you use compare to the model presented in the article?

Application

How might the ISD model presented by Rosenberg be adapted to an academic setting? What would the inputs and outputs be for the:

Analysis phase?

Design phase?

Development phase?

Implementation phase?

Question

What are the limitations of applying the systems model for instructional development in an academic setting?

Integrating Instructional Theory with Instructional Design

Key Issues

Although in the most general sense, instructional systems design is merely a systematic process for the improvement of instructional practice, its underlying assumptions suggest a behaviorist foundation that is frequently at odds with many educators. While it is true that the concept of ISD has found its principal home in the task-oriented corporate/industrial training function, the model can be modified to accommodate a variety of instructional orientations. Since the inputs and outputs at each stage of the ISD process may differ depending on the particular orientation, it is important to effectively integrate your own philosophical or theoretical orientation with the systems approach.

Article

The following article provides an overview of the principal instructional orientations and suggests ways to apply them in the systematic development of instruction. Read the article, which is reprinted at the end of the module. Then return to this page and answer the questions that follow.

Martin, B. L., & Driscoll, M. P. (1984, August). Instructional theories: Maximizing their strengths for application. *Performance and Instruction Journal.*

Questions

Which of the instructional theories presented by Martin and Driscoll describes your own approach to the teaching/learning process? How did you come to have this particular orientation?

Application

How would your particular orientation to the teaching/learning process affect the application of ISD in the area of:

Needs assessment / analysis?

Objectives / design?

Delivery systems / development?

Application

Examine a current set of course plans or learning materials that are being used with students in your instructional setting. Evaluate these plans and/or materials in light of the following:

1. Which outputs of the instructional development process are reflected in these documents? Which outputs are absent?
2. How would you evaluate these materials in terms of internal consistency? Is there a clear and logical relationship between objectives, content, and methods?
3. Can you tell from these materials what the theoretical basis was for the outputs selected?
4. Given your present understanding of the advantages and limitations of ISD, what recommendations can you make that might improve the quality of the materials you reviewed?

References

Kemp, J. E. (1971). *Instructional design: A plan for unit and course development*. Belmont, CA: Fearon.

Martin, B. L., & Driscoll, M. P. (1984, August). Instructional theories: Maximizing their strengths for application. *Performance and Instruction Journal, 23* (6), 1-4.

Rosenberg, M. J. (1982, September). The ABC's of ISD. *Training and Development Journal, 36* (9), 44-50.

Snelbecker, G. E. (1987). Instructional design skills for classroom teachers. *Journal of Instructional Development, 10* (4).

Wildman, T. M., & Burton, J. K. (1981, Spring). Integrating learning theory with instructional design. *Journal of Instructional Development, 4* (3), 5-14.

Reprints

Rosenberg, M. J. (1982, September). The ABC's of ISD. *Training and Development Journal, 36* (9), 44-50. Reprinted with permission.

Martin, B. L., & Driscoll, M. P. (1984, August). Instructional theories: Maximizing their strengths for application. *Performance and Instruction Journal, 23* (6), 1-4. Reprinted with permission.

The ABCs of ISD*

(*Instructional Systems Design)

By MARC J. ROSENBERG

The dollar spent on training is a marginal dollar. Today, more than ever, training professionals must demonstrate the effectiveness of their programs, and, even more important, are held accountable for their training decisions. Spending money on unnecessary training, inappropriate training or training that *doesn't* train can spell disaster for those who design such programs.

Training departments can no longer afford the luxury of "training by whim." Courses can no longer be reflections of an individual's "idea" of what should be taught and how such training should be organized and delivered. Employees who constantly struggle to maintain a technically competitive edge can no longer look at a trip to the training center as a reward or a vacation!

The search for a process which would increase the likelihood of meaningful training development that meets both the needs of the organization and the student has resulted in the advancement of the *Instructional Systems Design* (ISD) model.

What is ISD?

The ISD model provides a procedure for *systematically* identifying and manipulating significant components which make up the instructional process, the goals of which are increased learning and improved performance. If trainers can *design* an instructional system so that all of its components work in harmony toward these goals, it is likely that the resulting training will be more meaningful and effective.

It is important to note that training is usually a very expensive way to solve a problem. There are alternatives, such as organizational design, job redesign, motivation strategies, changes to the work environment, changes in the reward structure, development of documentation to support a job, etc., which not only may be more effective in solving the problem, but far less costly as well. Therefore, it is vital that training and other human resource development personnel conduct what is commonly known as a "front-end analysis" of the problem to determine not only what solutions will work, but what solution will work *best*. While such an analysis is not part of ISD, the use of the ISD model presupposes that a decision to develop training to solve a performance problem has already been made and that training has been determined to be the best solution.

The ISD concept has been around for at least 25 years, and there are conceivably as many approaches to the process as there are practitioners of it. The basic ISD model is simple to understand and easy to use in almost any training environment, and the basic components of ISD, as described in this article, are universally applicable.

As viewed in Figure 1, ISD can be thought of as a series of processes all leading to the development of that meaningful and effective training program or product. Most ISD approaches contain five major phases. The first four phases, *analysis, design, development* and *implementation* are generally sequential; the outputs of one phase are the inputs to the next. The fifth phase, *evaluation*, is an interactive process which is applied throughout the ISD model.

Analysis is required

Figure 2 presents the *analysis phase* of ISD. Analysis is like research, and the skills required to conduct a good instructional analysis are similar to those of any good investigator. More often than not, the training problem at this stage is still unclear. The purpose of this phase is to define the problem by precisely specifying the training needs which exist and turning them into useful information for training development. While all trainers have some capacity to intuitively determine what type of training is required in a particular situation, such abilities are neither foolproof nor universally reliable for all possible training problems. Furthermore, *guessing* at needs is not *proving* needs, and without proof of need training development can become risky.

Fortunately, the ISD model requires that suspected training problems be analyzed first to determine their *exact* nature. This is done through a

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multidimensional approach often referred to as *needs assessment*. While there may be a variety of factors to consider in such an assessment, the basic ISD model centers around three types of needs: organization, learner and job.

Organizational needs are perhaps the most nebulous to assess because they are usually so global in nature. "Improve productivity," "create better morale" and "be a leader in the marketplace" are all examples of organizational priorities or mission statements. Organizational needs can affect decisions about which learners get trained, which jobs are subjects of training development and the availability of personnel and resources to get the development job done. The analysis of organizational needs, therefore, can provide an important perspective for the rest of the training development process.

Learner needs are more specifically related to the training problem. Some of the learner characteristics to analyze might include: intellectual and academic background, previous experiences and training, current technical knowledge and abilities, motivations, career orientation, age, sex, physical disabilities and any current or expected job performance deficiencies. Assessment usually involves interviews with supervisors and staff specialists who have designed the job or developed the equipment which is the subject of the training. Observing, interviewing and testing of job incumbents to determine learner needs and the extent of any performance deficiencies are also part of the assessment process.

Job needs are analyzed to determine the exact performance requirements for which training is contemplated. Through a process commonly known as *task analysis*, the basic steps in the performance of a job are broken down into their component tasks. Specific skill and knowledge requirements are derived, forming the basis for the content of the training.

Figure 1.

The Basic ISD Model

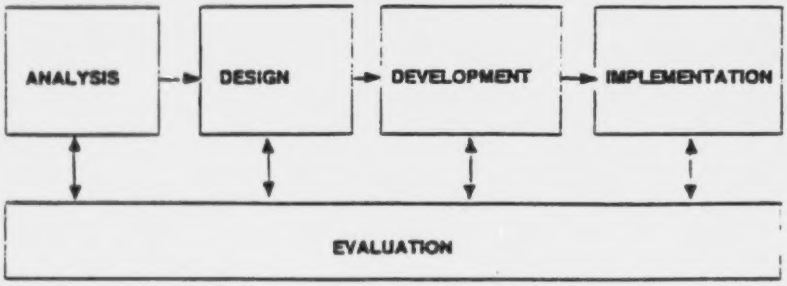
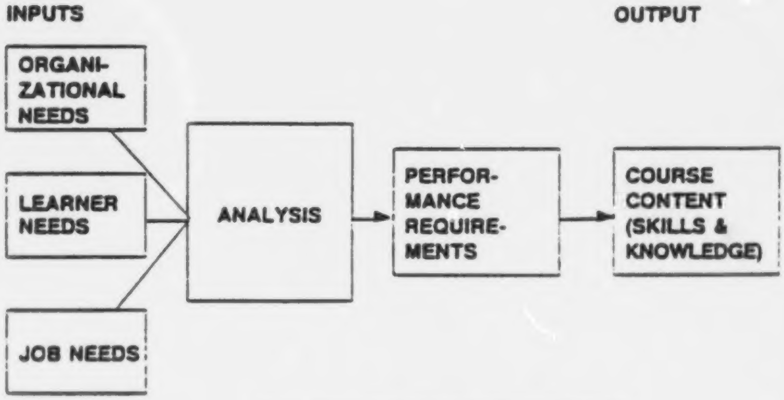


Figure 2.

Analysis Phase



EVALUATION

- Are all data accurate and complete?
- Have all the data been interpreted accurately?
- Can performance requirements realistically be achieved through training?
- Is the proposed course content complete?

In the analysis phase, the capabilities of the intended learner are compared with the performance requirements of the job; performance and/or knowledge deficiencies are noted. The skill and knowledge required to correct the deficiencies become the building blocks for the next ISD-component training design.

Evaluation of the analysis phase determines how well the research has been done. It is important to constantly monitor the data being collected to be assured that any changes in the organization, the learner or the job which might affect the development of appropriate training be identified and taken into account. In the analysis phase, the comprehensiveness and the accuracy of the data collected is critical if the ISD model is to be used successfully. Problems in these areas must be corrected *before* the design phase begins.

The design phase

The ISD practitioner should be confident that the skills and knowledge requirements, as determined in the analysis phase, are accurate and complete before moving to the *design phase*. If the content is incorrect or inappropriate, the resulting training will not meet the needs of the organization, the learner or the job.

It is tempting to begin the design phase by taking the content and writing the training program directly from it. But without a framework for developing sound instruction, such training may prove to be ineffective and may no longer resemble its original intent or the needs it sought to address. Even more important, those responsible for training development may not be aware that such deviations occur.

The ISD model *requires* that a framework be established using the proposed course content as an input to the design phase. The design phase, as depicted in Figure 3, results in the establishment of a training development plan, a "blueprint" which guides the creation of all training materials and strategies.

Instructional objectives are the preliminary output of the design process. They are extremely important as statements of the intent of the training. Instructional objectives are specified in observable and measurable terms, describing exactly the end-of-training behaviors that the learner must demonstrate as proof of mastery of the course content. Instructional objectives are derived from the skills and knowledge which make up the course content and serve as a bridge between the need for training and the training itself. The instructional objectives now provide a framework for specifying the characteristics of the training in three major areas: tests, materials and strategies.

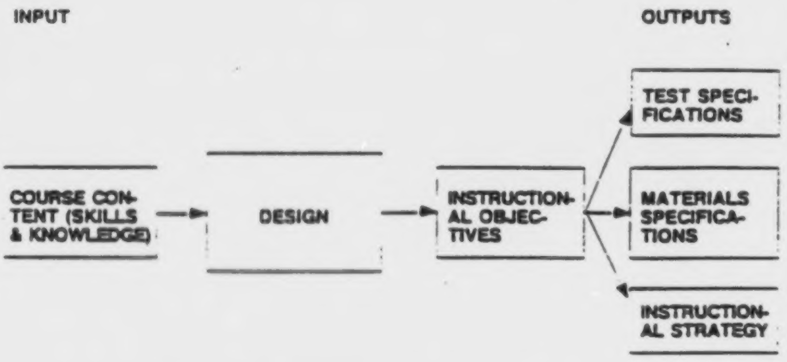
Test specifications are determined from an analysis of the instructional objectives. This assures that students are evaluated on behaviors related to their learning and performance needs. Considerations as to when to test, how often to test, testing format (performance vs. pencil-paper), testing risk, level of job-like simulation, equipment/simulators required, test time and student achievement criteria are noted in the test specifications.

Materials specifications cover media, textbooks, workbooks, training/job aids and required instructor materials. Outlines for scripts, basic sketches of media, preliminary student-oriented exercises and overall teaching schedules are some of the materials specifications developed in the design phase.

Instructional strategy details how the training will be delivered. Will it be instructor-led, group-paced or individualized? Additional decisions about the structure of practice, lab and case-group work, the type of questions to pose to students and even the degree of difficulty or challenge which should be incorporated into the course must be made in the design phase.

Figure 3.

Design Phase



EVALUATION

- Are the instructional objectives related to the performance requirements?
- Do the tests follow from the objectives?
- Do the materials facilitate the attainment of the objectives?
- Is the instructional strategy selected appropriate for the desired training outcomes?

Clearly, test, materials and strategies are interrelated. Alterations in one component may affect others. Any change in how students will be evaluated (tests), for example, may affect the kind of materials they will interact with. Or, a change in teaching approach (strategy) and a change in media may be required. This is why training developers need a clear and exact perspective on the purpose of training. Agreement on the desired outcomes of the training, as reflected in the instructional objectives, provides that anchor of agreement and assures that the training design will result in the development of training materials which will work.

Evaluation of design phase activities, therefore, involves the continuing assessment of how needs are translated into training. The evaluation process at this stage of the ISD process is two-fold. First, be sure the instructional objectives are clear reflections of the performance requirements as detailed in the course content. Second, be sure the tests, materials and strategies to be employed in the training are designed to facilitate attaining those objectives by the students.

The development phase

As depicted in Figure 4, the training design is translated into actual training materials in the development phase of the ISD model.

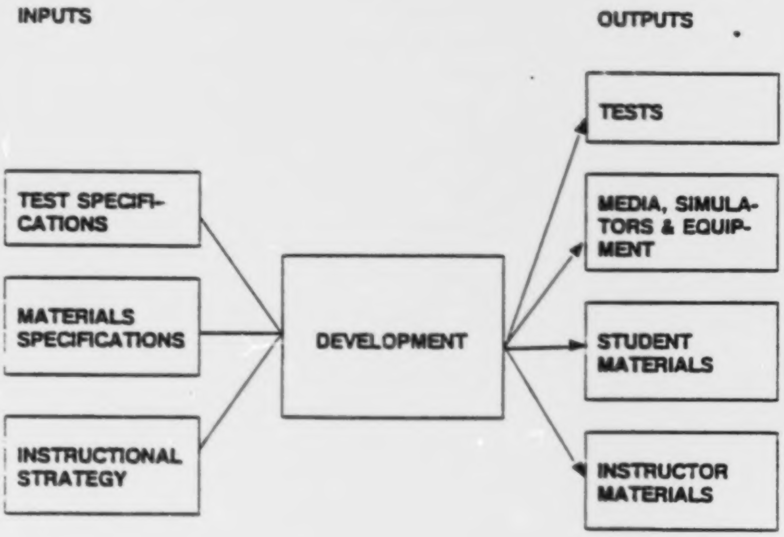
Assuming that the test, materials and strategy specifications are complete, the production process can usually proceed smoothly. As training materials are produced, they should be evaluated to determine their effectiveness and how well they meet the training needs (analysis phase) as detailed by the instructional objectives (design phase).

Evaluation in the development phase of the ISD model is critical. Through a process known as "developmental or prototype testing," the training materials are tested to determine if they work as intended. Developmental testing involves review by content and instructional experts, as well as tryouts with small groups of typical students. Such testing is concerned with the relevance, accuracy, completeness, ease of use, ease of understanding and instructional effectiveness of training materials and methods. Developmental testing allows trainers to determine if problems exist with the materials or the instructional strategy *before* full scale implementation and exposure to large numbers of students. Good developmental testing can not only save training dollars, but can pinpoint where in the ISD process improvements need to be made. Obviously, developmental testing is a continuous and sometimes repetitive process within the development phase.

Tests should be developmentally examined to determine if they are valid (related to the content and objectives, and discriminate between students who have received training and those who have not. Developmental testing should also determine if the tests are reliable (produce similar results with similar students) and unambiguous in their directions, wording and structure.

Figure 4.

Development Phase



EVALUATION

- Are the tests valid and reliable?
- Do all media, etc. communicate effectively?
- Are student materials complete and facilitative of learning and performance?
- Do the instructor materials transmit the intent of how the training is to be delivered?*

*Instructor-led courses only.

Media should be tested for effectiveness and efficiency of communication. Audio and visual considerations play an important part in whether training media hinder or facilitate the instruction. Group-oriented media should be easily seen and heard by all students, simple enough to be understood and supportive of the instructor's comments. Individualized media must communicate the message even more efficiently; there is no instructor nearby to clear up any confusion. Thus, developmental testing is an integral part of the media production process.

Student materials should be tested with typical learners to assure they are complete and easy to use. This involves examining the format, writing style, level of difficulty and sequence of the materials in addition to content accuracy and relevance.

Instructor materials should be tested to assure that complete details on how the course is to be delivered and how students are to be evaluated have been provided. While many instructors have been involved with the development of the training, it is quite possible that one or more new instructors will inherit the course when it is finished. A comprehensive set of instructor materials assures continuity between the instructional strategies designed and the actual delivery of the training. For individualized training, an administrative guide is highly recommended.

Generally speaking, the development phase of the ISD process is complete when developmental testing indicates that all materials have been produced according to the design specifications and that those materials perform as required in simulated training environments.

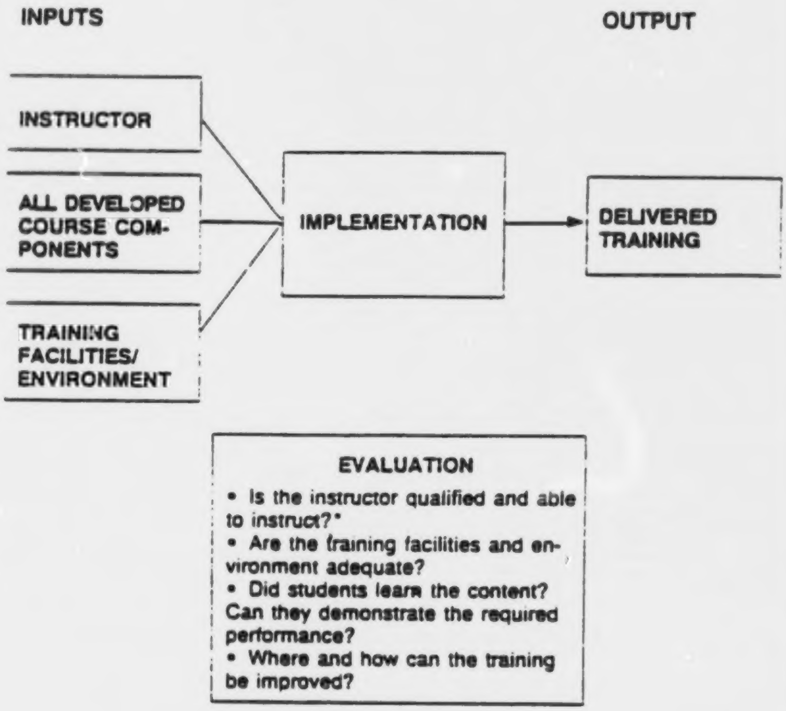
The implementation phase

The implementation phase of the ISD model affords the training development team the opportunity to observe and evaluate their program under actual training conditions. It is inappropriate, however, to assume that the various course components produced in the development phase are all that affect the delivery of the training. As shown in Figure 5, two other major factors must be considered. These factors are the instructor and the training facilities/environment.

Instructor characteristics can affect training delivery in both positive and negative ways. While there is disagreement as to whether instructor training is a part of ISD, the model assumes that the instructor is qualified as a content expert and as a teacher. Instructors who possess both of these qualities are more likely to display confidence and subject matter command in the classroom. In addition, they are apt to be better communicators with the students, thus earning the class's respect. These are highly desirable characteristics because they can enhance delivery, and therefore, make training more effective. The implementation phase of ISD recognizes the effect teaching can have on learning and performance.

Figure 5.

Implementation Phase



- Is the instructor qualified and able to instruct?*
- Are the training facilities and environment adequate?
- Did students learn the content? Can they demonstrate the required performance?
- Where and how can the training be improved?

*Instructor-led courses only.

Training facilities and other environmental factors can also affect the effectiveness of the training program. Classrooms for large group presentations, caserooms and laboratories for small group practice and simulations and individualized learning stations must be comfortable, free from distractions (e.g., sight obstructions, outside noise) and accessible to the students when needed. Equipment, including the various media technologies, must be in working order and well-suited for the facility in which they are being used. Self-instructional media, such as computer terminals and multi-media kits, should be designed for ease of student use and facilitative of student-media interaction as required. As with instructors and all course components, poor training facilities can result in reduced effectiveness for the training program. Thus, ISD requires consideration of these factors prior to full-scale implementation.

Evaluation in the implementation phase is both a short- and long-term process. In the short-term, the evaluator is concerned with the readiness of the instructor, the facilities and the training materials for full-scale delivery. In addition, the performance of students during training and at its conclusion is of paramount importance for obvious reasons. In the long-term, the evaluator is concerned with detecting any possible deterioration in the training. Changes over time, in instructors, facilities or training materials can alter effectiveness. Therefore, the monitoring of student performance and attitudes toward the course is recommended for the life of the training. Problems, once identified, are referred back to the appropriate phase of the ISD process for revision.

While the analysis, design and development phases of ISD have somewhat identifiable starting and ending points, the implementation phase is clearly an ongoing process as long as the training is delivered. While such long-range activities may be beyond the responsibilities of the original training development team, they are well within the confines of ISD. In effect, the ISD process is a never-ending approach to maintaining as well as designing training.

A relationship between events

The ISD model is more than a sequence of events. It depicts a relationship between events! It is this relationship which makes the model so effective in its application to training development. It assures that a decision to develop training is based upon the realistic and identifiable needs of the organization, the learner and the job. By setting clear and measurable instructional objectives, the design and development of training which relates to those needs can also be assured. Through the constant testing of materials, problems in the training program can be quickly identified and remedied. And, by monitoring the application of the ISD process itself, improvements in training development procedures can be realized. Thus, the ISD model is a cost-effective way to develop training.

By following the philosophy represented in the ISD model, training development practices can be improved. But the beauty of ISD is that it can be embellished and specialized to meet specific organization and training demands. Moreover, any number of tools and job aids can be developed to make the application of the various ISD phases easier and more practical. Almost every organization that follows the ISD approach has developed additional procedures to support or expand the basic model. The successful ones, however, have been careful to keep the important underlying processes intact.

Many organizations support professional development in instructional systems design through in-house training or attendance at private seminars and workshops. There are also many graduate level university programs in ISD. In addition, a number of professional organizations, journals and books provide a great deal of additional information on ISD. A resource list is provided as a starting point on the road to more effective and meaningful training development.

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Instructional Theories

Maximizing Their Strengths for Application

Barbara L. Martin & Marcy P. Driscoll

Instructional theory, like learning theory, appears to be in a phase of collecting and analyzing data to support particular propositions or ideas rather than engaging in attempts to synthesize various positions into one or more comprehensive theories. Since there is virtual agreement among educators that there is neither one best way to teach nor one best all-purpose approach to learning, instructional theories or models espousing a particular position have proliferated (Gagne & Dick, 1983; Joyce & Weil, 1980). This trend, which can also be seen in learning psychology (Snelbecker, 1974), is particularly troublesome for practitioners and researchers who look to instructional theory to give direction and guidance to practice. Often the benefits of various approaches cannot be directly compared because of different philosophical orientations. Likewise, one approach cannot be said to be qualitatively better than another since each supports in some way one or more of society's or the educational establishment's goals. Individual educators, schools, districts and states are left to pick and choose among approaches or are mandated someone's preferred approach. It is an unfortunate and difficult situation.

The primary purpose of this article is to briefly explore the philosophical underpinnings and point of view of several instructional theories/positions and to suggest one way in which to maximize the strengths of these theories for instructional applications. Some thoughts and speculations are given about how seemingly opposing theories might be reconciled.

Instructional Theories

Instructional theories are prescriptive: they identify conditions of instruction that will optimize learning. Calling on their learning theory bases, they also provide descriptions of causal relations between these instructional conditions and the behavioral consequences of them (Gagne & Dick, 1983). As with learning theory we have yet to see a comprehensive instructional theory and models of instructional design continue to abound (Andrews & Goodson, 1980).

One way to approach the task of building a comprehensive instructional theory is to examine several major theories in light of how they serve specific needs of educators and to reconcile the differences among them. Table 1 lists four major instructional theories or positions, comparing them on several important characteristics and listing major strengths and weaknesses of each. The theories are: a) behavioral, b) cognitive information processing, c) cognitive inquiry, and d) humanism. These four instructional theories/positions are not the only ones that might be considered (see Gagne & Dick, 1983, for a review of others), but they were selected because of their general applicability to teaching and instruction.

By cognitive information processing, we mean theories such as Gagne's, which adopt an information processing model of cognition and seek to identify conditions of instruction that facilitate the presumed processes of learning. Ausubel is also included in this category, although he proposes his own theory of information processing rather than adopting one from cognitive psychology. By contrast, cognitive inquiry theorists, such as Bruner, place almost sole emphasis on inquiry processes as the goal and mediators of learning.

Since identifying goals, developing instructional procedures and strategies, and conducting evaluations are major activities of teaching, the next sections will further explain some information provided on Table 1 with regard to each.

Goals. The behaviorists are neutral with respect to goals and what should be taught in schools. They maintain that an adequate, useful theory should have established procedures applicable to all objectives. They support operational definitions and predesigned instruction but do not take a curricular position concerning what should be taught.

Acquisition of knowledge, or meaningful information, is the central thesis of Ausubel's cognitive theory, and with this broad base of knowledge, thinking develops. Instruction, in his view, should be predesigned to facilitate the acquisition of information, after which motivation and attitude development, for example, will automatically occur (Ausubel, Novak, & Hanesian, 1978).

Gagne and Briggs (1979), cognitive information processing theorists, support predesigned rather than extemporaneously designed instruction. Gagne has developed a taxonomy of five types of learning outcomes that represent the different types of capabilities students can acquire within particular fields of study (Gagne, 1977). Gagne's problem solving type of learning outcome is similar to cognitive inquiry conceptions, and he concurs with these theorists in suggesting that problem solving may be the most important goal of schooling (Gagne, 1970). He also acknowledges the limitations of his approach as it relates to motivation, personal value development, and personal interaction, but states that these are not of central importance to his taxonomy, which is concerned with the development of goals related to academic subjects and career paths.

The cognitive inquiry theorists emphasize thinking processes and inquiry skills as the most important goals of education. In general, they see no limitations to their approach: it is applicable to all subject matter, all disciplines, and all students.

The humanists take the position that the most important goals of schooling are learning to learn, assumed responsibility for learning, and self-development. While recognizing and acknowledging the importance of facts and knowledge, Rogers (1969) sees this as a secondary goal. The humanists endorse a view of humanity that would lead to fundamental changes in the purposes and goals of schools.

Procedures, Methods and Strategies. Both behaviorists and cognitive information processing theorists emphasize predesigned instruction and mostly structured learning environments. The behaviorists favor individual pacing, frequent assessments to determine student progress, use of systematic procedures for modifying methods and strategies, use of reinforcement contingencies, and small step learning. They focus on arranging external conditions to influence observable behavior indicative of learning.

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Table 1
Some Important Characteristics of Instructional Theories

Theories Characteristics	Behavioral Theories	Cognitive Information-Processing Theories	Cognitive Inquiry Theories	Humanistic Theories
Major Theorists	Skinner	Gagne-Briggs, Glaser, Merrill, Ausubel	Bruner Taba	Rogers, Maslow, Allport, Combs, May, Fromm
Dominant Psychology Theory	Operant Conditioning Reinforcement	Information-processing Eclectic Utilizes some behaviorist strategies (eg., task analysis)	Developmental Perception	Perception Personality Theory Clinical Psychology
Learning Domain Emphasis	Cognitive Psychomotor	Cognitive Lesser emphasis on psychomotor and affective	Cognitive —internal processes emphasized	Affective —learning is becoming —responsible students
Focus of Schooling Efforts	—behavior changes —product oriented	—problem solving —knowledge acquisition	—thinking, problem solving, concept information —process oriented	—self-development and growth —human potential —process oriented leading to problem solving
Teacher Role	Directs Manages Reinforces	Predesigns instruction Manages by arranging conditions	Guides Stimulates discovery	Facilitates-creates emotional and intellectual environment
Instructional Strategies and Procedures	Small steps Strengthen bonds leading to objectives Frequent assessment	Prerequisite skills Internal and external conditions	Discovery Inquiry	Experiential Emotionally meaningful student choice
Point of view of Learner in the Theory	Third person	Third person	First person	First person
Major Strengths	Research based Theory compatible w/data Commitment to research and evaluation Operational definition of objectives	Identifies five types of learned capabilities in taxonomy Derived from learning theory Sound empirical base Delineates limitation of theory	Even without empirical support, educators favor this position Characterized learner as active information processor	Concern with "whole" person-feelings, experiences, and behavior Student choice Focus on interpersonal relationships
Major Criticisms	Primarily applicable to low level and/or factual learning Student choice of objectives minimal Overly simplistic Findings from animals not always appropriate for humans	May not deal adequately with most important kinds of school learning A best taxonomy is a matter of opinion Task analysis pro-taxonomy to specify objectives is difficult and requires much practice	Theorists have not developed a competing theory Small data base Little interest in empirically testing instructional principles	Reaction to learning theories—primarily a philosophical position Little empirical validation Can student determine what he needs to learn? Terms used do not lend themselves to operational definitions

By contrast, the cognitive information processing theorists arrange external events of instruction to support and facilitate the hypothesized internal processes of learning. To this end, a wide variety of methods and procedures is encouraged, with the additional expectation on Gagne's (1977) part that these will vary according to the learning outcome desired.

Gagne and Briggs (1979) also endorse analyzing goals into their component subskills in a hierarchical fashion and sequencing instruction according to prerequisites. In reference to such hierarchical analysis, however, Hilgard and Bower (1966) state, ". . . it is by no means clear that a sequence of instruction can be designed upon it, or that the basic notion is sound that the lower steps of the hierarchy have to be mastered before the higher steps can be learned. There may be a kind of cyclical development in learning, in which the various stages repeatedly assert themselves" (p. 571).

Cognitive inquiry theories emphasize discovery learning and inquiry process skills. They endorse these as goals of education as well as instructional procedures.

They suggest beginning with propositions or details of problems and having students reason possible solutions or hypotheses. They emphasize that there is not always one right answer as the behaviorists seem to suggest; that the educated guess is an important aspect of creativity and discovery; and that learners must be active participants in the learning process. Sequencing, according to Bruner, should progress in a developmental fashion from concrete to graphic to symbolic.

Humanistic psychologists focus primarily on creating an emotional environment. Rogers (1969) is more interested in the process of learning than in how to teach. He opposes additive learning and emphasizes student choice and emotional involvement. His procedures are eclectic, favoring discovery and inquiry, but he acknowledges the benefits of programmed instruction to fill gaps in student knowledge. The major distinction between the behaviorists' use of PI and the humanists' use is the student's desire to learn and student selection of PI as the route to take.

The teacher's role varies considerably from theory to theory. The behaviorists and information processing theorists prescribe a more directive teacher both during the design of instruction and during implementation. Instruction is often designed to be replicable. The cognitive inquiry theorists endorse the role of teacher as guide and facilitator. The humanists encourage teachers to create an emotional environment designed to foster learner self-growth. The strategies and material are flexible and variable. Interestingly, none of the theories/positions adequately addresses the learner as a group member, but focus primarily on the individual student.

Assessment and Evaluation. The behaviorists explicitly define objectives and procedures for evaluation. The teacher is primarily responsible for evaluating student progress.

Information processing theorists, like the behaviorists, believe in predetermined objectives and criterion-referenced evaluation. Periodic evaluations are seen as a major means for both improving student learning and evaluating the instructional process.

The cognitive inquiry theorists believe that the student should develop his or her own means for evaluating progress. They acknowledge, however, that this is easier in subject matter or content areas where divergent thinking is not stressed, e.g., math.

Humanists oppose teacher-centered evaluation and believe students should assess their own progress. One of the major criticisms of this theoretical position questions the students' ability to set their own learning goals and evaluate their own progress.

Summary. In looking for maximum applicability, it is important to note the strengths and weaknesses of the various positions. The strengths associated with the behavioral and information processing theories are:

1. They are the most empirically sound and thoroughly researched;
2. They focus on the readiness of learners for instructional objectives and procedures;
3. The operational definition of objectives allows for sound evaluation procedures; and
4. Gagne's taxonomy is seen by some as the beginnings of a unified instructional theory (Hilgard & Bower, 1966, p. 569).

Perhaps the major criticism of behavioral and information processing theories is that the behaviors addressed are not necessarily those of most importance to education and the goals of schooling. Snelbecker (1974) suggests that Gagne's taxonomy is biased toward those aspects of learning that have been most thoroughly studied rather than what is most important. This criticism is perhaps less one of the viability of the theory and more one of philosophical orientation, i.e., what are the major goals of schooling?

Although the cognitive inquiry theorists have not actually developed a competing theory or gathered empirical support for their instructional principles, public opinion tends to favor this position (Snelbecker, 1974). Likewise, the humanists have failed to develop a theory supported by research; yet, their focus on overall student development is a very appealing position.

Attempts at Reconciliation

One of the major areas of conflict between behaviorists, cognitive information processing theorists, cognitive inquiry theorists, and humanists is the extent to which goal setting and preplanning can be accomplished. The behaviorists and information processing theorists have shown that instruction can be predesigned, implemented, and evaluated. They are criticized because the goals they select often seem too straightforward and easily amenable to their approach. It has been suggested that the behavioral approach is excellent for use with training goals, but is inappropriate for loftier educational goals. The cognitive inquiry and humanist theorists also support preplanning but focus their efforts on arranging the instructional environment so that students experientially learn academic content, develop problem solving and thinking skills, and grow emotionally and affectively.

The reconciliation of these theories does not seem to be a matter of which is correct or even most appropriate for a given situation. During any instructional situation, there are times when one or another theory or some combination is appropriate and should be used. Rather, the question of reconciliation may be one of combining the strengths of each group.

At the risk of over-simplification, we see the strength of behavioral and information processing theories as twofold. First, there is a methodological strength. The rigor of establishing goals, specifying criterion measures, matching activities and strategies to objectives and learners, plus the use of a feedback mechanism to revise and improve instruction is a positive element of these theories. The benefit to instructors is multiplied when they design and plan their own instruction since they must think differently when the starting point is a particular group of learners and particular goals. Behaviorists recognize the potential of their methodologies when they suggest that an instructional theory must work with any objective and "even instructional failures may be helpful since one can more precisely define the sources of the problem" (Snelbecker, 1974, p. 405).

Another methodological strength is the use of task analysis procedures. Most theories, particularly the information processing and behavioral, suggest that problem solution is largely dependent on the nature of the task; task analysis procedures are encouraged. Wildman and Burton (1981) suggest the use of task analysis to undersand how the expert problem solver organizes and structures knowledge. They state that this process may be a useful way to address internal structures. Hilgard and Bower (1966), reviewing studies of motor-learning also state the importance and necessity of task analysis, ". . . even what appear to be simple tasks are indeed quite complex, the psychological processes involved run the whole gamut from simple associative learning to higher forms of information processing . . ." (p. 547).

A second major strength of the behavioral and information processing theories (Gagne & Briggs, 1979) is the use of constructs that might be valuable content when teaching thinking and problem-solving skills. The students who successfully guide their own thinking and learning strategies may also increase their self-esteem and enjoyment of the tasks at hand. Some of the constructs used by these theorists that could also be viewed as content for facilitating internal structures and for guiding one's own learning include:

1. Systems Theory—setting goals, selecting components and establishing boundaries, finding links, interrelationships, and interactions, and evaluating results.
2. Concept Development—learning to recognize classes of objects and ideas, discriminating among classes, and synthesizing classes.
3. Task Analysis—specifying the nature of the task, breaking it down into meaningful parts, synthesizing the parts into meaningful wholes.
4. Perceptual Theory—using concepts like proximity, closure, and similarity to organize and make sense out of data.

Such constructs (that do not come exclusively from behavioral and information processing theories) could be taught to students as content to enable them to guide their own problem-solving and creative endeavors. This approach is similar to those reviewed and described by Sternberg (1983).

From the cognitive inquiry and humanist theories/positions, a major strength is that they force us to think more broadly about the purposes and goals of education and how to accomplish those goals. The continued focus on problem solving, creativity, self-development, and aspects of the affective domain as goals, and the view of the student as an active learner and a developing emotional human have piqued our sensibilities and started us thinking about our attempts to foster these goals. The potential exists to develop the goals of these theorists using the methodology of the behavioral or information-processing theories. For example, the apex of an affective domain taxonomy might be something to the effect that "Each student creates within himself a positive internal environment for learning and self-development." Presumably this goal would please cognitive inquiry and humanist theorists since the focus is on individual development and problem solving. However, the goal also has the beginnings of an operational definition. Criticisms of cognitive inquiry and humanism about students' inability to guide their own learning may subside if students have previously had necessary intellectual skill training. This might include learning to apply systems theory, having a mechanism for clarifying the intent of a goal for themselves, developing personal strategies, and evaluating their progress in attaining some goal.

The quest for operational definitions of goals such as the one mentioned above may help clarify the purposes of schooling and eventually aid in formulating sound instructional procedures for these goals. The insistence on affective education, developing internal strategies, problem solving and creativity as goals of schooling should stimulate behavioral and information processing theorists to try out their more complete theories on these goals. Where insufficient, it is hoped these theories can be expanded.

There is no comprehensive instructional theory but there are a number of points of agreement among theorists that can guide practice. Hilgard and Bower (1966) list twenty areas of mutual agreement which include the following: a) an active learner; b) the use of repetition and reinforcement; c) the essential organization of knowledge from simplified wholes to more complex wholes; d) the generalizability and longevity of "learning with understanding;" e) the importance of goal-setting by the learner; and f) the effects of group atmosphere on what is learned and the learner's attitude toward the learning situation. (See Hilgard & Bower, 1966, pp. 562–564 for the complete list.) Instruction, however, is so complex that instructional theory must also address a host of practical issues, e.g., motivation, attention, perception, interaction patterns, as well as state a philosophical orientation or belief about the purposes and goals of schools and the instructional situation. Still, much of what occurs in the classroom is experiential, intuitive, and based on common sense.

There are literally hundreds of avenues to explore; we have suggested one, i.e., that behavioral and information-processing methodologies may be useful in clarifying goals and finding the strategies necessary to implement goals proposed by cognitive inquiry and humanist theories. An eclectic theory, such as Gagne's, that uses behavioral and information processing constructs, and describes a variety of types of learning, appears to be the most promising line of inquiry to pursue. His taxonomy, coupled with an affective taxonomy specifying behaviors such as self-growth and attitude development and linking the cognitive and affective dimensions, may lead us one step closer to a comprehensive instructional theory. This line of thinking is currently being explored.

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Module 2

Module 2

Assessing the Needs of Learners

–Needs that Affect Instructional Planning
–The Basis of Instructional Needs: Content or Competencies?
–Special Needs of Adult Learners
–The Importance of Learning Style
–Making Use of Learning Style Information
–Assessing Internal Needs
–References
–Reprints

Assessing the Needs of Learners

Preview

As every instructor knows, students in a given course will exhibit varying degrees of interest and enthusiasm about their learning experiences. Some students will drop out, while others will attend sporadically, going through the motions. The rest will fully participate as though the course was of real value to them.

While instructors would agree that respect for individual differences and needs is an essential component of the teaching/learning process, most underestimate the impact that these differences have on the success of instruction. In this module, you explore the types of needs learners bring to the educational setting and how you can integrate these needs into your instructional planning efforts.

Goals

In this module you are invited to:

- Explore the types of needs that bring learners to the instructional setting and that affect their learning readiness
- Contrast the competency-based and conventional approaches to needs assessment.
- Examine other alternative methods of assessing learner needs
- Recognize the special needs of adult learners and their impact on learning readiness
- Evaluate the relevance of learning style to the issue of individual learning needs

Needs that Affect Instructional Planning

Definition

In its simplest terms, a need represents a gap between where one is and where one wants to be. In the context of learning, it usually represents the gap between one's current attitude or behavior and a desired attitude or behavior.

Key Issues

Learners enter the instructional setting with two sets of needs. The first set of needs is externally determined, either by public mandate, parental pressure, changes in society or occupational demands. For example, some of the external needs that are encouraging adults to return to school include:

- advances in technology which make present scientific and technical knowledge quickly obsolete
- changes in the workplace which signal a shift from an industrial society to an information state

If instruction could be developed with attention to external needs alone, education and training would be a matter of merely matching learners with appropriate programs of study. What makes teaching more of an art than a science is the challenge of addressing the second set of needs.

This second set includes those internal needs that are unique to each individual student. They include:

- Personal goals and motivations for learning
- Developmental needs
- Cognitive needs, i.e., learning style
- Situational needs

Demographic changes, combined with increased educational access, have made the assessment of internal needs more important than ever. The ever increasing diversity of learners in both the training environment and academic setting has resulted in student populations that are highly heterogeneous in terms of age, ethnic background, life roles, employment and educational experience, basic skills and motivation for learning. This is particularly true for adult learners as Figure 2-1 illustrates.

FIGURE 2-1: SOURCES OF LEARNER DIVERSITY

TABLE 1
A Continuum Depicting Diversity Among Learners

TRADITIONAL STUDENTS	ADULT LEARNERS
HOMOGENEITY	HETEROGENEITY

DIMENSIONS OF CONTINUUM

- Learning Styles
- Life Transitions
- Developmental Tasks
- Prior Experience
- Motivation
- Life Roles
- Learning Goals
- Patterns of Participation in Formal Programs

Adapted from Sheckley, B. G. (1984). The adult as learner: A case for making higher education more responsive to the individual learner. *CAEL News*, 7(8), 8(1).

It is only through addressing both sets of needs -- both internal and external -- that instruction can be effectively developed. The next topic looks at how external needs, particularly those that reflect vocational and professional demands -- can best be accommodated in instructional designs.

The Basis of Instructional Needs: Content or Competencies?

Key Issues

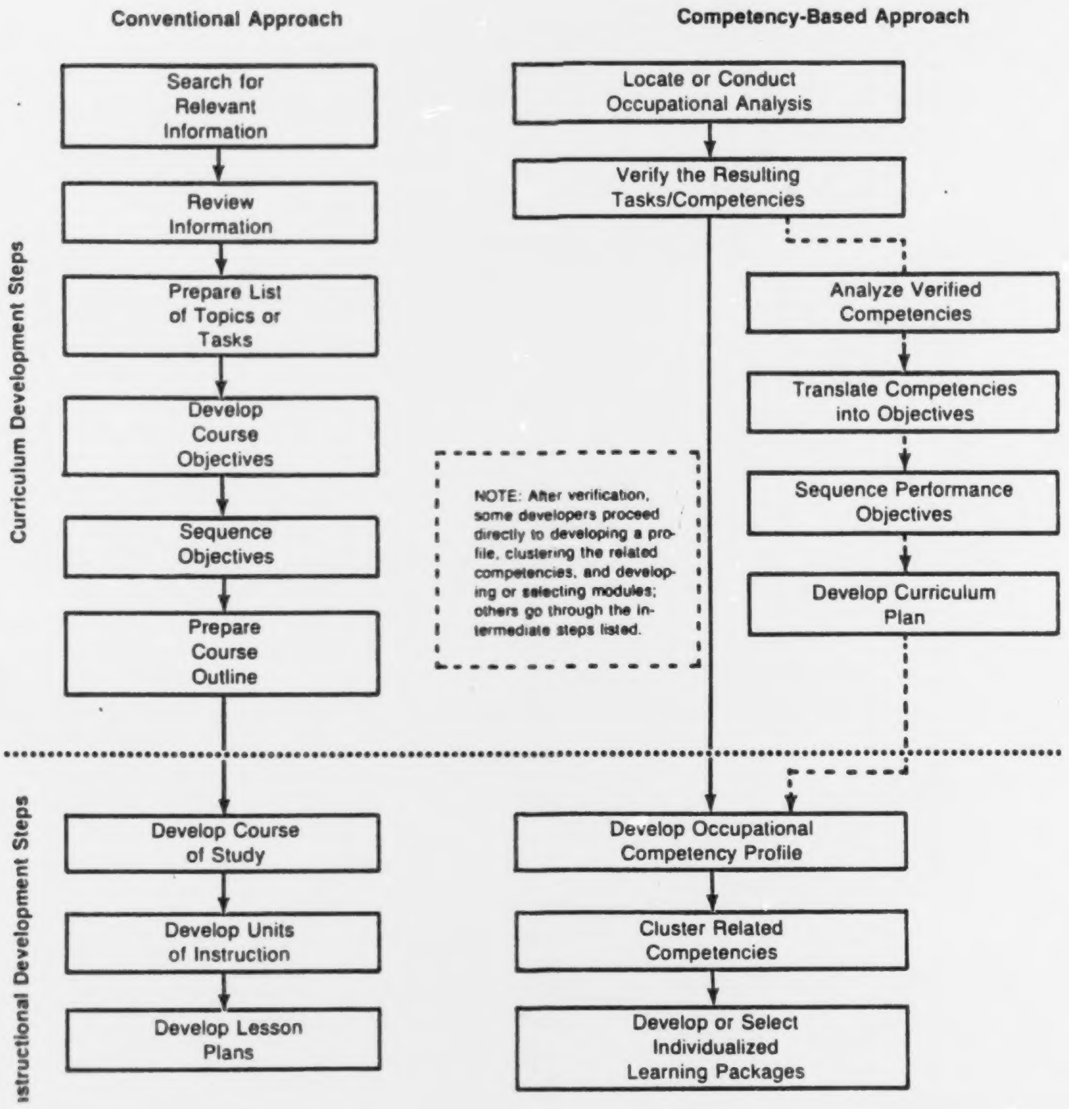
In traditional instructional planning, learning needs are derived from the content of the course or program of instruction. As the principal subject matter expert, the instructor surveys available resources and performs a content analysis, determining which concepts and topics are most critical to the course. He/she then organizes the selected topics in a manner that best reflects the structure of the knowledge base being taught.

One alternative to this traditional approach to needs assessment is that offered by the competency-based orientation to education. Competency-based education is based on the assumption that the competencies required for successful performance in a specific role can be identified and taught. Satisfactory completion of a competency-based program is not based on the number of courses taken or hours accumulated, but on the successful demonstration of behaviors associated with the competencies required.

Instructional systems development (ISD) provides a suitable framework for determining needs in a competency-based environment. The contrast between the competency-based approach and the traditional approach to determining instructional needs is illustrated in Figure 2-2.

Competencies are usually identified through some kind of discipline-specific, profession-specific, or occupational analysis. Validation of these competencies and their component behaviors involve surveying experts and their supervisors who have been working in their fields. These competencies and component behaviors are then analyzed to determine the knowledge, skills, and attitudes that must be subsequently translated into learning objectives, activities, and assessment methods through the ISD process.

FIGURE 2-2: CONTRASTING APPROACHES TO NEEDS ASSESSMENT AND INSTRUCTIONAL DEVELOPMENT


Conventional Approach
Competency-Based Approach
Curriculum Development Steps
Search for Relevant Information
Review Information
Prepare List of Topics or Tasks
Develop Course Objectives
Sequence Objectives
Prepare Course Outline
Locate or Conduct Occupational Analysis
Verify the Resulting Tasks/Competencies
Analyze Verified Competencies
Translate Competencies into Objectives
Sequence Performance Objectives
Develop Curriculum Plan
ıstructional Development Steps
Develop Course of Study
Develop Units of Instruction
Develop Lesson Plans
Develop Occupational Competency Profile
Cluster Related Competencies
Develop or Select Individualized Learning Packages

NOTE: After verification, some developers proceed directly to developing a profile, clustering the related competencies, and developing or selecting modules; others go through the intermediate steps listed.

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Since the competency-based approach tends to work best with vocational programs where occupational skills can be delineated and broken down relatively easily, CBE is often dismissed by educators responsible for teaching in the professional or academic disciplines. In fact, various professions have been analyzed for common attributes, and generic competencies have been identified (Stark & Lowther, 1986, p.13).

Professional Competencies

- *Conceptual competence*--Understanding the theoretical foundations of the profession.
- *Technical competence*--Ability to perform tasks required of the professional.
- *Contextual competence*--Understanding the societal context (environment) in which the profession is practiced.
- *Interpersonal communication competence*--Ability to use written and oral communication effectively.
- *Integrative competence*--Ability to meld theory and technical skills in actual practice.
- *Adaptive competence*--Ability to anticipate and accommodate changes important to the profession.

Professional Attitudes

- *Career marketability*--The degree to which a graduate becomes marketable as a result of training.
- *Professional identity*--The degree to which a graduate internalizes the norms of a profession.
- *Ethical standards*--The degree to which a graduate internalizes the ethics of a profession.

- *Scholarly concern for improvement*--The degree to which a graduate recognizes the need to increase knowledge in the profession through research.

- *Motivation for continued learning*--The degree to which a graduate desires to continue to update knowledge and skills (Stark & Lowther, 1986, p. 13).

Although specifying outcome competencies for the academic disciplines is somewhat more difficult, non-traditional colleges such as Alverno, Sterling, Mars Hill and St Paul have made considerable progress in this area. For example, Alverno College, a private Catholic institution located in Milwaukee, Wisconsin, has developed eight competency clusters for their bachelor's degree in liberal studies.

Resources

For a description of the Alverno curriculum and the methodology used to specify academic competencies, see the following:

Alverno College Faculty. (1985). *The Alverno curriculum* (3rd ed.). Milwaukee, WI: Alverno Productions.

Alverno College Faculty. (1985). *Alverno college ability-based learning program* (rev. ed.). Milwaukee, WI: Alverno Productions.

Questions

What are your overall conclusions regarding the utility of the CBE approach to needs assessment? What reservations do you have?

Article

Competency analysis represents only one alternative approach to identifying learning needs. In the following article, author Catherine Cameron presents some other methods for determining these needs. Read this article, which has been reprinted at the end of the module, and return here to answer the questions that follow.

Cameron, C. (1988). Identifying learning needs: Six methods adult educators can use. *Lifelong learning.*

Questions

How does Cameron define "learning need"? Do you agree with this definition? Why or why not?

Questions

Which of the methods described in the article seem most adaptable to your practice setting? What modifications would you have to make to accommodate this approach?

Special Needs of Adult Learners

Key Issues

Although the distinction between adult and traditional-age students is often blurred by the diverse and ever changing nature of the human species, it is useful to examine some of the special needs that tend to distinguish adults as learners. Some of these needs are summarized below.

Experiences	Adults need to use prior experiences in learning new endeavors. The acknowledgement of this earlier experience helps adults link new knowledge with the old.
Sense of Relevancy	Adults need to know how the learning is relevant to their particular situation. New information must fit into a current need.
Learning Style	Adults need to learn in a manner that is consistent with their own learning style
Support Systems	Adults need special support systems to assist them in their life transitions and re-entry into the instructional environment.
Mattering	Adults need to feel that they are appreciated as a significant contributor to the learning experience.
Self-Determinism	Adults need to be treated as responsible individuals; however, this need may stop short of accepting responsibility for self-directed learning.

Resource

The assumptions on which these needs are based, as well as the implications of these needs for adult learners in the academic setting, are discussed in the following publication:

Center for Innovative Programs. (1989). *The adult learner in higher education: A resource and planning guide*. Long Beach, CA: Office of the Chancellor.

Application

How are the following needs manifested in the instructional setting? What methods could you use to assess these needs?

Experiences

Sense of Relevancy

Learning Style

Support Systems

Mattering

Self-Determinism

The Importance of Learning Style

Key Issues

In his book, *In Search of Human Effectiveness: Identifying and Developing Creativity* (1978), Donald MacKinnon writes:

> *The wide range of individual differences surely must mean that there is no single method for nurturing creativity; ideally the experiences we provide should be tailor-made, if not for individual students, at least for different types of students. We should remember that the same fire that melts the butter hardens the egg (p. 171).*

When educators think about individual differences, the first differences that usually come to mind are those related to ability and interest. While these factors are certainly crucial in the instructional equation, there is at least one other factor that has a significant impact on the outcomes of instruction. That factor is *learning style*.

Definition

Simply stated, learning style is the "way in which each person absorbs and retains information and/or skills" (Dunn, 1984, p. 12). It refers to the way in which each individual collects, organizes and transforms information (Cross, 1976; Kolb, 1984). Among other things, it influences the setting in which people learn best, the kind of subjects they want to learn about, and how they will approach the learning situation.

Learning style incorporates a variety of dimensions -- perceptual, emotional, environmental, social. The *perceptual* dimension of learning style, for example, refers to the way information is extracted from the environment by the senses. The *emotional* dimension includes those feelings, attitudes, and personality states that influence information gathering, knowledge building and its application. *Cognitive* learning style refers to the way in which information is mentally processed (Witkin, et al., 1962, 1977; DeCecco & Crawford, 1978; Kolb, 1978).

Article

The work of David Kolb is particularly relevant to a discussion of learning style. The following article describes his concept of learning style and its relevance to adult learners. Read this article, reprinted at the end of the module. Then return to this page to answer the questions that follow.

Sheckley, B. G. (1986). Learning styles as habits of partial learning. ***CAEL News.***

Question

Would you consider individual learning style to be an advantage or a limitation in terms of the learning process? Explain.

Questions

Assuming that learning styles represent habits of partial learning, what is the implication for instruction? How can you facilitate changes in such habits? What could be done to facilitate development of new patterns of learning?

Making Use of Learning Style Information

Key Issues

Friedman and Alley (1984) identify six principles that make meaning out of the research on learning styles:

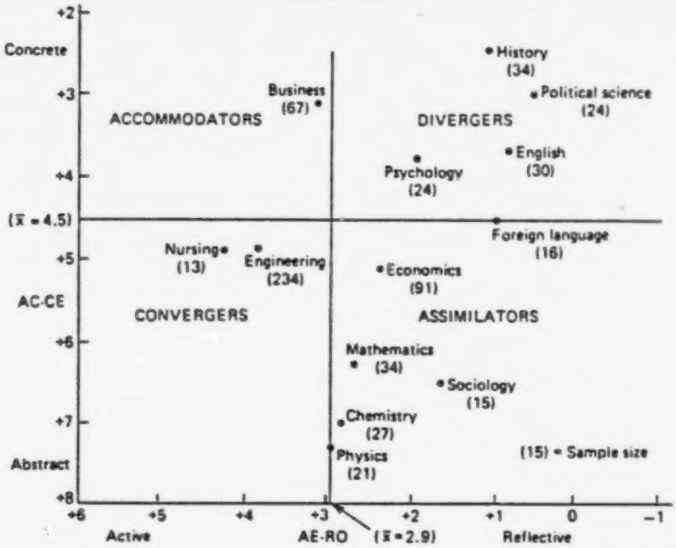
1. Both the style by which the teacher prefers to teach and the style by which the student prefers to learn can be identified.
2. Teachers need to guard against over teaching by their own preferred learning styles.
3. Teachers are most helpful when they assist students in identifying and learning through their own style preferences.
4. Students should have the opportunity to learn through their preferred learning style.
5. Students should be encouraged to diversify their style preferences.
6. Teachers can develop specific learning activities which reinforce each modality or style.

Doyle and Rutherford (1984) suggest some practical questions that should be considered before attempting to implement learning style information. First of all, the instructor must decide which dimension(s) of learner style to consider important. Should it be based on sensory mode preferences or cognitive styles? What instrument should be chosen to measure learning style? What preparation is required to administer it?

Assuming that these dimensions can be isolated and measured, how much diversity can be accommodated? How many instructional situations can be devised to accommodate variations in learning style, and how can these multiple alternatives be managed within the instructional setting?

While matching teaching and learning styles on an individual basis presents a logistical problem, it may be possible to identify a particular learning style that fits most learners in the group. The following figure shows the results of Kolb's research with undergraduate college students and preferred learning styles. (Fry & Kolb, 1979, p. 79-92).

FIGURE 2-3: AVERAGE LEARNING STYLE INVENTORY SCORES ON ACTIVE/REFLECTIVE AND ABSTRACT/CONCRETE BY UNDERGRADUATE MAJORS



David A. Kolb, *Experiential learning*, (c) 1984, p. 86. Reprinted by permission of Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

It is difficult to establish a causal relationship based on the correlation suggested above. Are individuals' learning styles shaped by the fields they enter? Or are they attracted to these fields *because* of their particular orientation? The truth appears to lie somewhere in between -- people choose fields that are consistent with their learning styles, which are then reinforced by the learning norms of those very fields (Fry & Kolb, 1979).

Article

The following article provides suggestions for using learning style information to improve instruction. Read this article, reprinted at the end of the module. Then return to this page to answer the questions that follow

Dixon, N. M. (1985). The implementation of learning style information. *Lifelong Learning*.

Question

What are the practical limitations of accommodating individual learning style?

Application

What are some specific strategies you might implement in your own course(s) to meet each responsibility suggested by Dixon?

Helping individuals understand themselves as learners.

Encouraging students to expand their learning styles.

Using a variety of instructional approaches.

Creating an environment in which diversity can thrive.

Creating a climate in which collaboration exists.

Assessing Internal Needs

Procedures

Learning style is only one one of several internal needs that learners bring to the instructional setting. How can these various needs be identified?

There are a variety of methods for gathering information on learner needs. Referrals to existing information as presented in formal assessment surveys, student or employee records, and prior interviews or observations would be the first line of research. The remaining methods listed below can be implemented at the outset of instruction.

- Information cards
- Group discussions
- Questionnaires and surveys
- Informal interviews

Regardless of the method selected, it is important to explain to learners the purpose for gathering such information and that it will be held in strictest confidence.

Questions

What methods, if any, do you use now to gather information on your students' internal needs? How effective are these methods?

Question

Many instructors find it advantageous to secure personal information from students through a variety of methods. What other methods might you consider implementing in your practice setting?

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By Catherine Cameron

Identifying learning needs: Six methods adult educators can use

Meeting learners' needs is a fundamental tenet of adult education. Long (1983) and Sork and Buskey (1986) found that almost all adult education program models include some type of needs assessment. There is no consensus, however, on how to define learning needs and even less on how to identify them (Long, 1983). This article will look at adult learning needs from weaknesses of six needs assessment methods.

What Is A Learning Need?

A learning need is broadly defined as a gap between "what is" and "what should be," a discrepancy between the present level of performance and a higher level which *ought* to exist for the individual's benefit, the good of the organization, or the welfare of the society (Knowles, 1970:85). In practice, however, learning needs are difficult to define. First, there is the question of *who* determines that a gap exists. Second, there are instrumentation issues related to *what* the gap is. And, third, there may be philosophical, ethical, or pragmatic concerns about *how* to close a gap. That is, even when consensus exists regarding a discrepancy between actual and desired status, there may be no agreement that education is an appropriate solution. This issue is beyond the scope of this article. Figure 1 shows the relationship between who defines a need and how that need might be defined.

A learner may perceive a need or desire to increase knowledge or skill levels based on personal beliefs or feelings, informal observations, or objective criteria. Externally, learning needs are attributed to individuals or subgroups who compare unfavorably to others (comparative need) or to some accepted standard (normative need). Attributed learning needs should be empirically verifiable through appropriate performance measures.

Ideally, there should be little difference between the learner and the outside expert's perceptions of the learning gap. The learner's recognition of a skill or knowledge deficit leads to ready acceptance of educational services and high motivation. The adult educator's accurate assessment of the learner's needs and interests leads to programs which are successful in enrolling students and meeting their needs.

Six Methods for Identifying Learning Needs

Needs assessment methods used in adult education and training range from highly informal and intuitive to in-depth analysis of performance problems. Each approach has both strengths and weaknesses as shown in Figure 2.

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Lifelong learning: An omnibus of practice and research, Vol. 11, No. 4, 1988.

Figure 1
Categories of Adult Learning Needs

Self-identified	Externally-identified
UTILITARIAN: Vocational Avocational Personal responsibilities	NORMATIVE: Doest not meet standards
GROWTH: Special interest Self-actualization	COMPARATIVE: Performance below a comparable group

Figure 2
Characteristics of Six Needs Assessment Methods

	User		Strengths and Weaknesses		
Method	Learner	Planner	Cost	Marketing Information	Teaching Information
Intuition	Yes	Yes	Low	?	Low
Market Analysis	?	Yes	Medium	High	Low
Surveys	No	Yes	Medium	Medium	Low
Self-Assessment by Learners	Yes	Yes	Medium to High	Medium	Medium to High
Diagnostic Approaches	No	Yes	High	Medium	High
Performance Analysis	No	Yes	High	High	High

Intuition: A "seat of the pants" approach of offering educational opportunities and then noting how many and what types of people enroll is the most frequently used needs assessment procedure in adult education (Nowlen, 1980). Intuition works well when the program planner has an accurate perception of the clients and the ability to sense emerging theories, fads, trends, or technologies which can be translated into new and creative adult programs.

The intuitive approach has two strong advantages: no cost and quick response. But, it is not effective if programs are based on values not shared by potential participants. In addition, the rush may be first with a new program or trendy topics may result in offerings based on untested theory which stimulate unrealistic expectations.

Even when informal needs assessment is accurate enough to select subjects or topics for courses, it may not provide sufficient information for those who design, deliver, or facilitate learning events. Intuition rarely extends to specific information about the nature or magnitude of the gap to be closed and may even fail to establish the desired outcome. It is difficult for the learning facilitator to devise effective helping strategies without knowledge of participants' current levels of skills, knowledge, or attitudes, and a precise description of what they should be able to do at the end of the instructional period.

If only a global statement of need has been made, a curriculum specialist or course facilitator may use one of the following ways to conduct a pre-instructional needs assessment.

1) Ask people who are knowledgeable about the participants what they think their learning objectives will be.
2) Come prepared to discuss a number of topics and involve participants in selecting those topics most relevant to their needs.
3) Use a needs assessment exercise at the first session, such as goal setting, a problem census, or listing learning objectives of group members.

Learning activities can also help participants relate content to their specific needs. For example, they can share perceptions on how material covered in a session related to their needs. Written "connections" exercises have participants write a brief description of concerns which stimulated enrollment in the course and, at appropriate intervals, asks them to answer questions about how course content can be applied or adapted to their own problems. Role plays and stimulations provide practice in applying new skills in contexts which resemble the participants' situations at home, on the job, or in the community.

Market analysis: Strategic market planning techniques used by business and industry are equally effective for educational planning and needs assessment. Scanning techniques probe the environment in which the agency functions and identify future threats and opportunities arising from demographic, economic, technological, or other changes. Most governmental units have current and detailed data on individuals and organizations within their boundaries. Professional and business journals and specialized newsletters alert planners to future trends and new technologies which signal a need for training or retraining of workers or, perhaps, leisure learning activities for older adults.

Activities of "competitors" must be carefully considered, as possible threats to enrollment and as a source of ideas. Nowlen (1980) found "the two most widespread ways of obtaining new program ideas from current practice are scanning materials from other programs and noting potential spinoffs from current local programs."

Internal data should also be included in strategic planning. For example, enrollment trends can be analyzed, noting who participates, how far they travel, what types of programs they enroll in, and whether specific offerings are attracting more or fewer participants.

Original studies to collect data about the community or participant population are both costly and time consuming. Andreasen (1985) suggests that specialized research studies be designed *after* initial planning has been completed so that planners can identify those data which will be useful in program decisions and target their research efforts.

Market analysis often results in a "follow-the-leader" approach to identifying learning needs. It is cost effective when most of the work can be done by the staff and little original research is required. Many adult educators have been trained in techniques such as Force Field Analysis which enable them to use market analysis data as input for programmatic decision making.

Market analysis tends to identify generic programs which will meet needs or interests of a fairly broad group of adult learners. This approach is used by commercial firms and large continuing education programs which design learning products or courses for a wide market, such as management development programs. Defenders of generic programs point out that economies of scale enable them to invest more resources in planning and instructional resources than is feasible with single course offerings targeted to very specific groups of learners. Commercial packages can be purchased or adapted at a lower cost and with a higher level of sophistication than an individual organization's resources would permit.

In a market-driven approach, the major responsibility for needs assessment rests with the consumer. S/He must evaluate the congruence of the promised learning outcomes with personal learning needs. The ethical service provider will carefully specify what learning objectives can be achieved by completing the course or learning package.

Surveys: Participant interest inventories are the second most used needs assessment procedure in adult education (Nowlen, 1980). Surveys are a quick and cost-effective way to gather data from a large group of geographically dispersed respondents. Results clearly indicate what people are *not* interested in. In a professional organization or the workplace, a survey conveys some sense of participation in selecting learning opportunities and can serve as advance promotion for presentations which follow.

Surveys fail to discriminate among needs, wants, interests, and effective demand. A closer estimate of probable enrollments is obtained by including items which assess the respondents' resource levels, such as time, money, willingness to travel, and other factors which are necessary to actual participation.

A more important problem is that of bounded rationality. As Bryson (1936) pointed out half a century ago, surveys identify needs and interests that respondents *currently* perceive. These perceptions are based on what is available or known rather than on what could be made available. Thus, surveys have limitations in identifying genuine but unperceived needs and potential, but unknown, interests.

A number of ways have been devised to ask what potential participants need. Professionals are often asked to state their continuing education needs. When funds are available, an adult education agency may conduct a community-wide needs assessment survey. Sometimes managers or supervisors are asked what training programs employees need.

Surveys have limited ability to identify specific content and processes which will lead to successful programs since most instruments simply list topics or content areas rather than specifying desired competencies or expected learning outcomes. As noted earlier, the person who designs and/or delivers the learning event must then decide whether to use a generic approach to planning the course or seek further information.

Self-Assessment of Learning Needs: Continuing education programs for professionals are often based on self-assessment of learning needs. Knowles (1970) is a strong proponent of this approach to needs assessment and professional associations with certification standards are beginning to use more sophisticated measurement, often in conjunction with criterion-referenced tests.

Self-assessment has several weaknesses. First, many of the simple instruments labeled "Self-assessment Inventories" are really interest inventories. Since there is a strong tendency to confuse learning interest with learning need, people generally tend to indicate needs in areas in which they already have some level of expertise.

A second major fallacy of this approach is asking people who have been identified as probably needing training to act as subject matter experts in diagnosing their learning needs. Thus, although supposedly lacking critical knowledge or skills in the content area, they are expected to function as accomplished practitioners who can set criterion levels and assess competence. An apt analogy would be to ask a person with limited medical knowledge to diagnose his own illness and select an appropriate treatment. Hiemstra and Long (1974), for example, found no correlation between physical therapists' "felt" learning needs as expressed on a mailed questionnaire and "real" needs as evidenced by scores on a multiple-choice tests of knowledge in the field. Ellis and Cameron (1976) found strong discrepancies between self-assessed learning needs of adult ESL teachers and observed teaching deficits. Stinard (1986) recommends that experienced personnel be used to rate the importance of particular skills and that specific training needs of experienced and inexperienced participants be considered in development of training programs.

Although the idea of self-assessment is appealing and appears relatively straight-forward to use, the hard reality is that this is an effective method only when potential learners are provided with adequate information to assess their needs. They need to have criteria for the expected level of competence and valid and objective ways to assess their current level of performance. Criterion-referenced items can be developed to pinpoint specific information or skill gaps. Swezey (1981) is a useful resource for adult educators who wish to construct quality self-assessment instruments.

The cost of quality instruments is justified if there are many potential participants, if they will enroll in an educational program when needs are identified, and if courses and/or independent study materials will be more efficient and/or effective as the result of better needs analysis.

Diagnostic methods: Diagnostic methods use experts to identify learning needs and prescribe an appropriate treatment. Instead of asking what the learning needs are, the diagnositician asks questions about gaps, problems, concerns, or opportunities not pursued because of lack of competence or confidence. Test scores or work samples may also be used to assess needs. If it is not feasible to test or question potential participants directly, people knowledgeable about them can be asked to describe symptoms or critical incidents which indicate educational needs. Information can be obtained from individuals, nominal groups, or panels. The process may also be combined with surveys, Delphi studies, or other data collection and prioritizing techniques.

Two major factors for success are selection of informants who truly represent the learning needs of potential participants and the ability of the interviewer to obtain complete and unbiased information. Because much of the data is derived from analyzing critical incidents or cases which are similar to contexts or problems facing actual learners, it provides the instructional designer or learning facilitator with empirical evidence to establish the importance and relevance of learning objectives. The process also provides information useful in developing examples, simulations, or other learning activities.

A quality self-assessment can pinpoint needs of specific groups of people in specific situations. However, it requires more resources, such as skilled personnel to conduct the study and access to appropriate informants. Unless data are collected from a number of different groups, the findings may not generalize to other settings. Its cost is clearly justified when only competent performance is acceptable, as in a nuclear power plant or medical setting, and high training costs preclude training all personnel on all critical tasks.

Performance Analysis Methods: Performance analysis assumes a system problem rather than skill and knowledge deficiencies and investigates multiple causes for poor performance, such as motivational factors and inadequate resources. The analyst also attempts to quantify and establish a value for the performance gap. Educational or training problems are *not* recommended unless performers fail the "gun test," i.e., cannot perform the task even when threatened with a loaded gun.

Performance analysis can sometimes be done quickly and easily, especially if existing records can be used to identify and quantify performance problems. Complex situations, such as multiple causes of performance problems and strong environmental barriers to their identification, require more resources.

Several conditions must be met

before initiating a performance analysis:

1. Access, to collect data from current job holders and understand the system in which they work
2. Resources, such as adequately trained personnel to do the needs analysis
3. Time, since it is not feasible to develop an intervention before the investigation and analysis are complete.

This is a powerful approach when the problem is probably not caused by knowledge of skill deficits and it is costly to the individual, the organization, or society. It is excellent for designing instructional replacements. Putting an economic value or cost on the "hurt" provides a selling point to management to implement recommended changes and helps trainees see the need for improving performance.

Adult educators who want to learn more about performance analysis could turn to some of the seminal works in the field, such as Gilbert's (1978) *Human Competence: Engineering Worthy Performance*. Mager and Pipe's (1984) slim volume, *Analyzing Performance Problems* is also helpful in analyzing the nature, importance, and cause of performance discrepancies.

So Which Method Should You Use?

As you may have inferred from reading this article, the author response to this question is, "It depends," followed by a series of diagnostic questions:

1) Are you concerned primarily about training for current job responsibilities, education for future job responsibilities, or general development of individuals?
2) What are your resources? Do you have time, trained staff, dollars, and access to people who can provide appropriate information?
3) Will the benefits of doing a high-quality needs assessment outweigh the costs?
4) What do you already know about the system, the environment, or potential participants? How would knowing more help you make better decisions?

If there is a known gap and the problem leads to high costs or significant hurts, then a detailed needs assessment method, such as performance analysis, diagnostic analysis, or high-quality self-assessment instrument based on criterion-referenced items would be worth the cost.

If you already know a lot about potential participants and there is negligible cost of being wrong, then the most cost-effective approach is to develop and field-test programs, soliciting feedback whenever possible.

If the major thrust of your program is general development, theoretical analysis and intuition will probably provide more information for course development than detailed analysis of current performance.

If you are developing programs for voluntary participants, such as traditional adult evening school programs, then market analysis and surveys should be used to supplement intuition.

Self-assessment is probably the most productive approach to stimulate awareness and interest in continuing professional education.

Nowlen aptly summarized the adult educator's need for mastering several methods of assessing learning needs:

> It is necessary for practitioners to have a rich variety of procedures with which to assess needs, generate and refine program ideas, plan future strategies and administrative arrangements, explore likely and desirable alternative futures, and influence the parent organization's priorities.

All six methods discussed in this article can be useful to adult educators. The best approach to a given situation is the one that is feasible, cost-effective, and provides relevant information for planning, implementation, and evaluation of adult learning events. **AAACE**

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LEARNING STYLES AS HABITS OF PARTIAL LEARNING

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Experiential learning theory (Kolb, 1984), depicts learning as an active process of grasping and transforming information. It differentiates experience and learning acquired from experience. Mark Twain anticipated experiential learning theory when he noted: "We should be careful to get out of an experience only the wisdom that is in it--and stop there; lest we be like the cat that sits down on a hot stove lid. She will never sit down on a hot stove lid again--and that is well; but also she will never sit down on a cold one anymore."

Since experiential learning is based on a four part cyclical process (see figure 1), the assertion, in the last issue of the **CAEL News**, that learning styles were habits of nonlearning represents an overstatement. More precisely, learning styles are habits of partial learning. The Kolb model integrates concrete-abstract and active-reflective dimensions of learning into a single framework. These dimensions form the basis for understanding learning styles. Tendencies to utilize one portion of the cycle exclusively represents a learning style. Because it focuses on only a fraction of the total learning process, it can be considered a habit of partial learning.

The first dimension (concrete-abstract), outlined in my previous column, describes how we "grasp" information either through specific apprehension of concrete events or through detached comprehension of symbols and abstract concepts. A tendency to grasp via concrete events is evident when someone discovers mint Oreo ice cream by eating it rather than reading about it. (The poet, e. e. cummings, indicates a strong preference for concrete apprehension: "...since feeling is first/who pays attention/to the syntax of things/will never wholly kiss you.") Enjoyment derived from reading about China--and not actually traveling there--represents an inclination to grasp via comprehension. (Aristotle celebrates this preference: "The actuality of thought is life." Similarly, Descarte: "I think, therefore I am.") While the modern tendency is to embrace comprehension and view subjective apprehension suspiciously, the experiential learning framework emphasizes both processes as essential for learning: "knowledge and truth result not from the preeminence of one of these knowing modes over the other, but, from the intense coequal confrontation of both modes" (Kolb, 1984, p.105).

The second dimension (active-reflective), also outlined in the last issue of the CAEL News, describes preferences for transforming--or personalizing--objective information. A reflective preference is illustrated when an artist personalizes (transforms) apprehensions of Spring's arrival by appreciating bewildered crocuses peeking through snow covered ground. (The relation of apprehension to reflection is captured by Alexander Pope: "Remembrance and reflection how allied!/ What thin partitions sense from thought divide!") An active preference is manifested when abstractions (comprehensions) like "the vernal equinox" are tested against actualities of playing baseball with skicaps instead of baseball hats. (Sophocles asserts: "Knowledge must come through action; you can have no test which is not fanciful except by trial.") The strength of an active preference is humorously stated by the English novelist John Galsworthy: "A man of action forced into a state of thought is unhappy until he can get out of it." As with the grasping processes (i.e., apprehension and comprehension) the transformation processes are coequal partners in learning. "Learning...occurs through the active extension and grounding of ideas and experiences in the external world and through internal reflection about the attributes of these experiences and ideas" (Kolb, 1984, p.52).

The active process of experiential learning allows for individualized grasping and transforming patterns termed learning styles. Kolb (1984) defines how people tend to grasp reality through varying degrees of emphasis on apprehension or comprehension and transform it via varying degrees of reflection and action. Individuals who characteristically grasp via apprehension and transform via reflection are called "divergers." Sensitive to feelings and values, these learners imagine implications, like ambiguous situations and possess excellent brainstorming and valuing skills. "Assimilators" grasp via comprehension and transform via intention. Their preference for organizing information, building conceptual models, and testing ideas is seen in highly developed problem analyzing and thinking skills. Individuals who like to grasp via comprehension and transform via action (i.e., "convergers") excel at creating new ways to thinking and doing, analyzing solutions and making decisions. My favorite learners (because I am one) are "accommodators." By grasping the world via apprehension and transforming it via extension, they seek and exploit opportunities, become personally involved, convince and lead others and have highly developed implementation and acting skills.

Learning styles can be likened to tennis strokes. For example, I have a (sometimes) skilled preference for grasping opponent's shots with my forehand and transforming them into cross-court volleys. Unfortunately, tennis also requires baseline, overhead, and (ugh) backhand strokes. With only forehand volleys, I am a partially developed tennis player. So too with learning. Adaption to the world requires a diverger's valuing skills, an accommodator's thinking skills, a converger's deciding skills and an accommodator's acting skills. A learning style represents a skilled preference for one adaptive mode. It is a habit of partial learning because only selected grasping and transforming processes (e.g., reflection and comprehension) are used while others (e.g., action and apprehension) are ignored.

Curricula which emphasize one particular learning style only, facilitate rapid acquisition and use of information appropriate to that grasping and transforming process (Sheckley, 1985). For example, to develop skilled thinkers, instruction would only emphasize reflection and comprehension. However, to develop learners with an adaptive learning style flex, curricula must emphasize valuing, deciding, acting as well as thinking skills. Kolb and Fry (1975) argue for learning environments where the purpose of major activities, primary sources of information, rules guiding learner behavior, teacher roles and feedback provisions are modulated to provide educational programs which have affective, perceptive, behavioral symbolic complexity. Using this approach, we could be assured of developing learners who, unlike Mark Twain's cat, would gain full wisdom from their experiences.

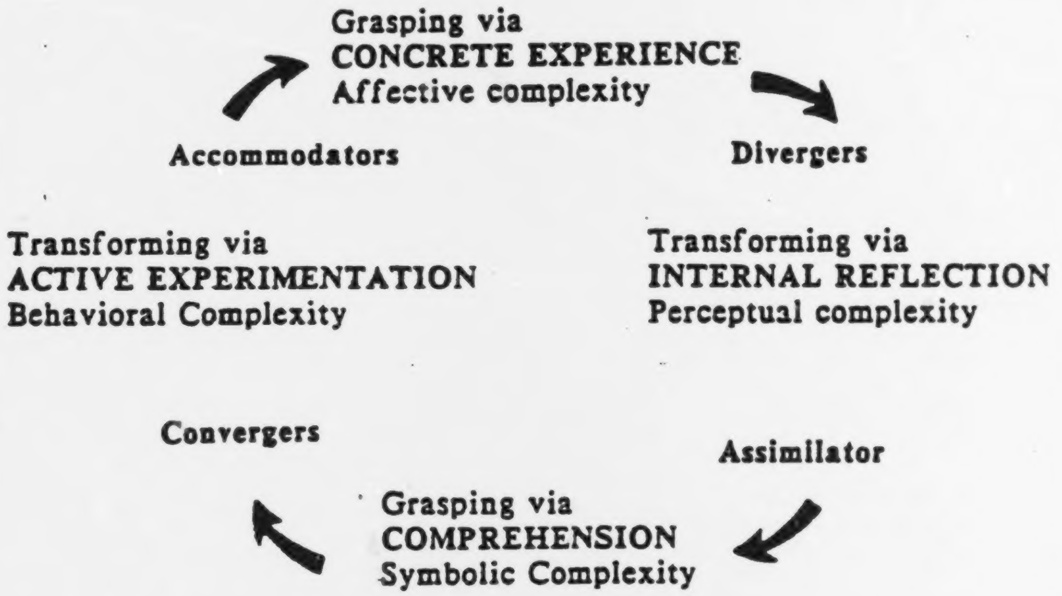
Grasping via
CONCRETE EXPERIENCE
Affective complexity
Accommodators
Divergers
Transforming via
ACTIVE EXPERIMENTATION
Behavioral Complexity
Transforming via
INTERNAL REFLECTION
Perceptual complexity
Convergers
Assimilator
Grasping via
COMPREHENSION
Symbolic Complexity

Figure 1. Experiential Learning Cycle (Kolb, 1984)

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By Nancy M. Dixon

The implementation of learning style information

"Every complex problem has a simple obvious solution that is wrong."
Menken

The concept of learning style (that individuals differ in the ways they learn) is receiving growing acceptance from educators. Learning style information is viewed as a promising way to improve teaching effectiveness in the present educational environment where the increasing diversity of the student population has reduced the effectiveness of standard classroom practice.

Learning style, as the term is being used here, refers to the individual's preferred ways of grasping and transforming information (Kolb, 1984). Preference does not imply that these ways are the only or perhaps even the best ways for the individual to learn a given subject matter. They are, however, the styles with which the individual has the greatest experience and therefore represent the individual's learning strengths.

The actual implementation of the learning style concept has lagged behind its acceptance by educators. The lag has occurred for three major reasons. First, what would seem on the surface to be a simple one-to-one correspondence between a learner's style and an appropriate instructional methodology is in reality very complex. An individual's learning style is in fact not one style but many. Any individual may have preferences for group work, auditory input, a holistic rather than serial presentation of information and so on. Matching instruction to multiple variables becomes much more complex than matching to only one variable. Second, many aspects of learning style appear to vary from subject to subject (Entwistle, 1981; Laurillard, 1979). Learning style appears to be fluid as well as complex, making matching learners to instruction even more unfeasible. Finally, the lag in implementation has occurred because it is difficult for an instructor whose teaching load may range up to 200 students a day, to meet the individual learning preferences of each one. Thus educators who agree with the basic assumption that each individual learns differently, and who acknowledge that a simple matching model is not feasible in most situations, are left without an implementation formula. The lag then appears to be caused, not by lack of interest in learning differences, but by the lack of a realistic implementation methodology.

Asking the Wrong Question

It is possible to consider this new body of theory and research about learner differences not as a way to improve the effectiveness of current instruction, but rather as the basis of a new way to conceptualize instruction. In other words, "How can an instructor use learning style information to improve instruction in present day classrooms"? This implies an instructor-controlled implementation model. The question may be reframed to ask, "How can learning style information be used to increase learning"? In this case options as to who will use the information and under what circumstances are left open for consideration.

This paper suggests a possible answer to the more generic of the two questions, "How can learning style information be sued to increase learning"? It is proposed that the learner be responsible for using the learning style information and that the instructor assume the responsibility for creating an environment in which the resulting diversity can be accommodated.

Using this approach, the understanding and acceptance of learning style information by educators may serve as an impetus to move the learning process from the present instructor-directed approach toward a more learner-directed approach. Such a change is in keeping with current theory in cognitive psychology which views the learner as an active rather than a passive actor in the learning process (Dember, 1974; Weinstein, 1977). Consideration is given here to the ways an instructor can facilitate the learners' use of learning style information. Five instructor responsibilities are suggested: (a) helping individuals understand themselves as learners, (b) encouraging individuals to expand their learning styles, (c) using a variety of instructional approaches, (d) creating an environment in which diversity can thrive, and (e) creating a climate in which collaboration exists.

Helping Individuals Understand Themselves as Learners

Although the responsibility for using

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learning style information is assigned to the learner, instructors' assistance is needed initially to obtain the learning style information. The idea that an instructor should accept the responsibility for helping students learn about learning is new to many instructors who see themselves as content specialists, not learning specialists. Such instructors might prefer to leave the topic of learning to counselors, or to study skills courses. However, as suggested earlier, learning style is a dynamic process which can vary with subject matter. Each new learning experience offers the student opportunities for understanding his/her own learning processes better. Thus, instructors in each course need to assist students in understanding themselves as learners in relation to that specific content. Suggested here are two techniques, learning style instruments and introspection, which instructors can use to help individuals better understand themselves as learners.

Learning style instruments

A number of learning style instruments have been developed (see bibliography for a list of instruments and their publishers) that assist individuals in gaining insight into themselves as learners. In employing such instruments it is helpful for instructors to carry out the following five steps: (a) administer the instrument, (b) explain the meaning of the results or items, (c) display the tabulated results for the entire class, (d) facilitate a class discussion about differences, and (e) critically examine the instrument. When instruments are administered, scored and returned to students without the opportunity to discuss the results, much of the value is lost. Both class discussion and displaying the group's range of scores help make individuals aware of the diversity within their own group. As a consequence of their realization of the diversity, individuals often improve their own self concept as a learner. Individuals who previously viewed themselves as "poor" learners may realize they are really "different" learners who, though they have weaknesses, also have strengths which others in the class do not possess as fully. A critical examination of the instrument (the individual items, how it has been normed, its reliability and validity) helps in understanding the applicability and limitations of the results.

Learning style instruments hold as much potential for harm as they do for good. Because scoring procedures use numbers and scales it is tempting for both learners and instructors to assume the instruments are able to provide definitive answers. When instructors use the test results to label and group students for instruction or when students come to believe they can learn only in ways specified by learning style instruments, the validity of the instruments is being stretched beyond supportable limits. Learning style instruments are best used as tools to create awareness that learners differ and as a starting place for each individual's continued investigation of self as learner.

Introspection

An effective technique that may be used in place of (or in addition to) learning style instruments is to ask students to reflect on their past and present learning experiences. Few learners have given previous thought to their learning style. More commonly, students' contemplation of learning has been directed toward evaluating their ability to accomplish the tasks required by instructors. By contemplating their own learning strengths, weaknesses and preferences, learners are able to gain considerable insight. The results are strikingly similar to those reflected in learning style instruments. Introspection provides the additional benefit of allowing learners to examine the subtle differences that are not reflected in the broad categories defined by learning style instruments.

Students can draw generalizations about how they learn from their past experiences. In writing about such experiences, it is useful for students to consider both formal learning (such as takes place in a classroom) and informal experiences (such as learning to wire an electrical socket at home). Learners also benefit from observing and reflecting on the processes they are presently using. Students can accomplish this by writing an addendum to assignments stating the processes used to complete the assignments. A learning log (a daily record that focuses on the process of learning rather than the content being learned) is another tool students can use to focus on how they learn.

Instructors can also facilitate the student's growing awareness of learning style by frequently calling attention to the learning process being used in the classroom and asking students to respond to its effectiveness for them.

Encourage Students to Expand Their Learning Styles

The implementation of learning style information not only requires students to understand and use their own learning strengths, but also to acknowledge the limitations of their preferred style and thus to begin to purposefully expand their repertoire of learning skills. Kolb (1984) explains that as students specialize in a discipline they tend to exercise the learning skills that are predominant in that field to the exclusion of the development of other skills. Thus students, through subject matter specialization, limit the strategies they use for learning. An instructor who is aware of the concept of learning style can encourage students to broaden their capabilities.

Style, as defined earlier, is the individual's preference for ways of grasping and transforming information. Examples of learning style drawn from many different instruments are:

- involving one's self in concrete experiences from which to learn versus learning through abstract ideas
- accepting information in a step by step fashion versus first gaining a "big picture"
- accepting the structure inherent in the organization of the information versus imposing structure upon it
- mentally categorizing ideas into a few large groupings versus creating many smaller and more discrete groupings of the information.

Learners may or may not be consciously aware of the processes they are using. When awareness is lacking, the preference can become the only way an individual learns, not because of inability to learn through other ways, but because the individual is not aware that other ways exist.

When students purposefully attempt to increase their repertoire of skills they begin to employ learning strategies rather than style. Strategy, as the term is being used here, is a conscious choice the individual makes about how to address the learning process. For example when the learner, who prefers to deal with information abstractly, chooses to create a concrete experience for him/herself in order to gain a different perspective, the individual is employing a strategy. Strategy then presupposes an awareness of more than one process through which to address a given learning task. It is the purposeful selection of a process the student assumes will bring about greater learning.

Instructors can assist students in raising style preference to the conscious choice level of strategy by (a) becoming more knowledgeable about differences in learning style, (b) openly discussing the strategies they themselves find useful, (c) acknowledging that their own strategies may be idiosyncr[illegible] acknowledging the style di[illegible] students which are reflecte[illegible] discussion or students' quest[illegible].

Use a Variety of Instructional Approaches

In order for students to understand themselves as learners, they must experience different ways to learn as well as use the abstractions of instruments and introspection. In a recent survey of instructional methods (Trani, 1979) over 4000 college students responded to 23 possible instructional methods in terms of the frequency with which they had encountered each. One third of the students reported that they had never experienced 14 of the 23 methods. Among the 14 methods were simulation/gaming, experiential learning, auto-tutorial, and discovery/inquiry. McCarthy (1980) has created a useful model for systematically varying instructional techniques. Using this model learners experience each of four styles giving each an opportunity to learn in their preferred manner.

The need for varied instruction relates not only to diversity in instructional techniques, but also to the skill of presenting information from perspectives other than one's own. Thus the ability to understand the learner's point of view, to accept the validity of other perspectives, to re-phrase statements so they are better comprehended by those of differing learning styles, are also important kinds of instructor diversity. An in-depth knowledge is necessary to be able to address a subject from varied perspectives, certainly more knowledge than is necessary for delivering a practiced lecture.

The responsibility for varied instructional techniques must be balanced with the instructor's own need to teach in ways that bring satisfaction to him or her as well (Dixon, 1980). In part the responsibility for instructional diversity is an administrative one. By selecting instructors who vary widely in their learning and teaching styles, greater diversity in instructional techniques is achieved.

Create an Environment in Which Diversity Can Thrive

When individuals become knowledgeable about themselves as learners they are capable of making informed decisions about the methodology and resources that can best meet their learning needs. However, this knowledge is only useful in an environment in which they have the opportunity to exercise those options. Thus the fourth responsibility of instructors who choose to utilize learning style information is to create an environment in which diversity is not only accepted but thrives.

The advent of individualized instruction in the late 1960s was an attempt to accommodate diversity. However, individualized modules provided for diversity only in the amount of time allowed for completion. In respect to other forms of diversity, individualized instruction was perhaps more restricting than normal classroom practice. An environment that adequately accommodates differences in learning style would allow for diversity in the selection of resources, activities, and groupings of students, as well as time.

The logistics of an instructor dealing with such an approach have been well outlined in Knowles' *Self-Directed Learning* (1975). Knowles' approach employs clearly stated learning objectives, either specified by the instructor, or developed in cooperation with the learner. Within the framework of the objectives, students are free to make use of resources and activities they find most helpful. The self-directed approach does not imply that students complete activities alone, rather Knowles assumes that students will use each other as resources as well as the instructor's lectures, the community, other instructors, and print resources suggested by the instructor and identified by the learner.

Another tool which promotes diversity, although aimed more specifically at the learner than the instructor, is the Personal Learning Guide (Baker, Dixon, Kolb, 1984). The guide includes a learning style instrument, an explanation of the resultant scores and a process which assists students in incorporating the concepts into their learning. The guide emphasizes the need for the learners to expand beyond their learning preferences by seeking out learning alternatives that will broaden both understanding and ability.

Create a Climate in Which Collaboration Exists

The competitive climate that exists in most classrooms is based on the assumption that all learners are alike in the way they process information. Differences in accomplishment are attributed to intelligence (conceived as a basic ability differing only in quantity) or effort. Holding this assumption, it is reasonable for instructors to promote a competitive learning climate. Such a climate serves to differentiate individuals of high ability from those of low ability and it presses learners (particularly those with low ability) to strive more diligently toward accomplishment.

If the assumption, however, is made that individuals do not all learn in the same way and that some of the differences that are observed are a reflection of learning style, then promoting a competitive climate may be dysfunctional. A collaborative climate in the classroom would seem to be more compatible with the assumption of learning differences.

In a collaborative climate, differing abilities and the unique perspectives those differences generate, can be used to deepen understanding of concepts to a greater degree than would be possible from only one perspective; problem solving in a collaborative environment generates more creative solutions than does a single focus. However, gains in depth of understanding and creative solutions both assume not just collaboration, but collaboration combined with diversity.

Two kinds of collaboration are referred to here, collaboration among learners, and collaboration between instructors and learners.

Collaboration between learners

A collaborative classroom might take any of many possible forms; learners providing feedback on each others' work, assisting each other in areas of weakness, helping to locate resources, tutoring each other, accomplishing group projects, learning from simulations. Collaboration does not necessarily imply group work. Rather it implies a willingness to view others as resources in terms of both content and process.

Instructor/student collaboration

A change from an instructor-controlled approach to a learner-controlled approach may necessitate a change in belief about learners themselves. An egalitairian stance is called for rather than the authoritarian stance more common to the instructor-controlled approach. In a collaborative climate the instructor sees him/herself as a fellow learner and assumes that individuals in the student role also have knowledge and experience to contribute. Thus a mutual respect exists.

In a collaborative environment the instructor assumes that learners bring their own goals to the learning experience and that those goals should be taken into consideration in planning the class activities. Kolb, Rubin & McIntire (1983) outline an interview process that instructors can employ during the first class meeting to facilitate the identification of both instructor and student expectations.

In order to permit learners to select options for themselves, instructors must feel that students are capable of making appropriate educational decisions. There is a small but growing body of reearch evidence to support this belief (Fourier, 1983; Jenkins, 1980; Trani, 1979). However, it appears that it is informed learners who are capable of making good educational decisions. Naive learners who base their selection of learning activities on enjoyment do not show gains in achievement (Clark, 1982).

Summary

The justification for the learners' use of learning style information rather than assigning that responsibility to the instructor is a functional one. First, learning differences are so complex that the only person capable of fully using the information is the learner him/herself. Second, only a small percentage of the learning an individual will do during his/her lifetime will be carried out in a formal classroom. For these reasons it is important that individuals understand their own learning style so they can create environments for themselves in which their learning is optimized.

Learning Style Instruments

Learning Style Inventory (Kolb) McBer and Company, 137 Newbury Street, Boston, MA 02116.

Learning Style Inventory (Canfield) Humanics Media, Liberty Drawer 7970, Ann Arbor, MI 48107.

Productivity Environmental Preference Survey, (Dunn) Price Systems Inc. Box 3271, Lawrence, KS 66044.

Readiness for Self-Directed Learning (Guglielmino) Guglielmino and Associates, 734 Marble Way, Boca Raton, FL 33432.

Paragraph Completion Method (Hunt), Ontario Institute for Studies in Education, 252 Bloor Street West, Totonto, Ontario M5S 1V6. AAACE

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Module 3

Formulating Objectives that Encourage Achievement

–The Value of Performance Objectives
–The Traditional Approach to Performance Objectives
–An Alternative View of Performance Objectives
–Designing Objectives: A Two–Level Approach
–Taxonomies and Their Value in Formulating Objectives
–Sources of Objectives
–Techniques for Writing General Learning Objectives
–Techniques for Writing Enabling Objectives
–Refining Your Objectives
–References
Reprints

Formulating Objectives that Encourage Achievement

Preview

One of the most important aspects of the instructional development process is the formulation of objectives. Objectives are the foundation of the instructional blueprint, and give order, purpose, and structure to any course or lesson. Based on careful consideration of program goals and student needs, objectives provide the crucial link between the instructional analysis and design. In this module, you will learn about the process behind the formulation of objectives, and the best methods for writing, editing, and sequencing them.

Goals

In this module, you are invited to:

- Evaluate the importance of the performance objective for instructional planning
- Explore the advantages and limitations of performance objectives
- Evaluate the utility of objective taxonomies for developing instruction
- Differentiate between general and enabling objectives
- Apply techniques for writing and editing objectives

The Value of Performance Objectives

Definition

A performance objective describes a change in behavior which a learner is expected to exhibit after exposure to instruction. Performance objectives define instructional outcomes in measurable, observable, and action-oriented terms, as shown by the examples below:

Examples

Differentiate between the functional/behavioral characteristics of a manager and those of a leader.

Given a compass, ruler, and paper, construct and bisect an angle larger then five degrees.

Purpose

The primary purpose of a performance objective is to establish a common understanding between instructional planners, instructors, and learners as to what is to be performed and by what criteria performance is to be evaluated. In addition, they:

- Clarify learning outcomes to both learners and instructional staff.
- Provide a basis for selection of instructional content and methodology.
- Ensure that instruction leads to competency.
- Provide a standard for the evaluation of learner progress.
- Provide a basis for instructional accountability.
- Provide a reference for revision of instruction.

Advantages

Learners, instructional designers, and instructors can all benefit from the use of performance objectives. Once **learners** know the performance objectives, they can:

- Organize their time, energy, and resources more effectively.
- Concentrate more intently.
- Improve their attitude toward the subject matter.

Once **instructional designers** and **instructors** know the performance objectives, they can:

- Develop instruction that is more relevant to learners' needs.
- Devise evaluations that accurately measure what the student is expected to learn.
- Select appropriate strategies, methods, and media for delivery of instruction to the target learner population.

Limitations

Many educators have questioned the use of performance objectives as the sole basis for instructional design (Brookfield, 1986; Tyler, 1985; Robinson and Taylor, 1983; Eisner, 1985; Apps,1973). According to Kemp (1977), Romiszowski (1981), and Brookfield (1986), some of the limitations most frequently cited include the following:

- Since the procedure for identifying objectives applies best to psychomotor and cognitive behaviors, affective areas such as esthetics and insight may be neglected.
- The higher and more important levels of learning receive little attention since most objectives relate to the lowest cognitive level (i.e., recall of information).
- It is difficult to identify in advance all potential outcomes of an educational program, particularly objectives that relate to the development of critical thinking skills or aesthetic appreciation.

- It is infeasible to equate the development of certain complex learning processes with a concrete, measurable outcome.
- While objectives may be useful in certain areas of education which require a hierarchical content structure (i.e., mathematics, natural sciences, foreign languages), their use is limited in areas which do not require such structure (i.e., the humanities, the arts, and social sciences).
- Self-directed learners should have the freedom to select, change, and/or develop their own objectives in collaboration with facilitators and peers. Pre-specified learning objectives are too constraining in programs designed for such learners.

After this rather lengthy list of objections to objectives, you may be wondering if they are really worth the trouble. The answer, of course, is "Yes," since the alternative -- designing instruction without any plan at all -- is far worse.

Questions Have you ever used performance objectives to guide your instructional planning? In what contexts have you used them?

Questions How did the use of objectives affect instructional outcomes? What were the benefits? The limitations?

The Traditional Approach to Performance Objectives

Description

Before discussing alternative approaches to their design, it will be beneficial to briefly review the traditional perception of objectives, which is based upon the work of Robert Mager. According to the Mager model, performance objectives contain three components (Mager, 1975, p. 23):

Performance: What the learner is to be able to do.

Conditions: Important conditions under which the performance is expected to occur.

Criterion: The quality or level of performance that will be considered acceptable.

The Mager model was originally developed to meet the particular constraints of programmed instruction. It is especially useful for training in specific job skills, since such skills can usually be broken into specific tasks that can be concretely evaluated. When such a model is applied in the academic setting, however, the model is useful "only for teaching the simplest skills and the lowest levels of knowledge" (Gronlund, 1985, p. 5). The result may be long lists of minute objectives that represent the trees but not the forest of learning.

Examples

Given a sequence of words pronounced by the teacher, the student will be able to demonstrate spelling rules involving I and E by writing each word correctly.

Given the need for a new item of information, the student will be able to generate a business letter, requesting information about a company's product, by typing the composed letter.

Note that ultra-specific objectives such as these tend to underestimate the complexity of learning, and may limit the learner's ability to generalize or transfer the learning to similar situations with different content.

An Alternative View of Performance Objectives

Description

For higher levels of instruction, Gronlund explains (1985, pp. 6-7):

> *It is possible to list only a sample of the specific types of student performance that represent each instructional objective. The list provides a guide for both teaching and testing, but it is obvious that instruction should not focus on the particular sample listed but rather on the larger achievement domain that the sample represents*

One alternative to the traditional approach is the concept of the *expanded performance objective* (Cyrs, 1977). Expanded performance objectives can address higher order intellectual skills and allow for a range of performance achievement. Because they are less specific, such objectives also allow for the application of learning to new situations, and are more easily derived from validated competencies. The instructor has more flexibility in terms of content instruction and can encourage and direct the learner to seek his or her maximum level of development. Some examples of expanded performance objectives are presented below.

Examples

The management trainee will apply established criteria in selecting an appropriate business software package for a personal computer.

The workshop participant will develop an instructional blueprint which is consistent with the model and supporting principles presented in this guide.

The behavioral psychology student will explain in writing if the conclusions reached by the author of a given article support the hypothesis.

Because such expanded objectives lack test-item specificity, performance standards and proficiency are often difficult to establish. Such objectives must usually be supported by conditions or procedures which are definitive enough to be practical and assessable.

Excerpt

Gronlund elaborates on the use of expanded performance objectives in his book *Stating Objectives for Classroom Instruction*. The following reading is an excerpt from his book. Read this excerpt, then return here to answer the questions that follow.

Gronlund, N. E. (1985). *Stating objectives for classroom instruction* (3rd ed.). pp. 32-38.

Questions

How does Gronlund's concept of minimum essentials relate to the idea of expanded performance objectives? Are they equivalent? Why or why not?

Questions

Do you agree that there should be a distinction between objectives that represent minimum essentials and those that encourage maximum development?

Questions

Would Gronlund's bi-level approach work in your practice setting? Why or why not?

Designing Objectives: A Two-level Approach

Description

Based upon the work of Cyrs (1977) and Gronlund (1985), a two-level approach to designing objectives has been developed. In this approach, a general learning objective or *competency* is identified which represents a broad, complex learning outcome. Some examples of general learning objectives include the following:

Examples

Apply the general approach of problem solving known variously as operations research, management science, systems analysis, or the quantitative business methods (QBM) approach.

Evaluate the importance of the role culture plays in determining how different people perceive and shape their world.

Use epidemiological concepts as the basis for community health nursing interventions.

After formulating the general learning objective, the *enabling objectives* are identified. The enabling objectives describe a sample range of behaviors which are necessary to achieve the general learning objective. Enabling objectives are more specific than general learning objectives and usually represent the lower levels of learning.

Examples

General Learning Objective (GLO):

Use epidemiological concepts as the basis for community health nursing interventions.

Enabling Objectives (EOs):

Identify the characteristics of the agent, host, and environmental factors involved in disease or injury.

Define the web of causation and the role of risk factors in disease or injury.

Identify the chain of infection which leads to a particular disease.

Relate the stages in the disease process to interventions at appropriate levels of prevention.

From these examples, you can see that enabling objectives differ from the Mager model in three significant ways:

1. They are thought of as "representative samples" of the different possible ways to achieve the general learning objective.
2. The conditions and standards of performance are not always included in the statement of the objective.
3. They are always linked to a general learning objective.

Application

The following exercise will test your ability to distinguish among different levels of objectives and statements which are not really objectives at all. Label each of the statements listed below as GLO (general learning objective), EO (enabling objective), or NO (non-objective. For those objectives labeled NO, provide a brief justification for your response.

Demonstrates effective verbal communication skills in a variety of controlled interviewing situations.

To increase the learner's ability to identify the seven principles of group problem-solving.

Applies critical thinking skills in reading essays.

Distinguishes between facts and opinions.

The workshop participant will role-play effective telemarketing techniques.

Identify logical fallacies in the writer's argument.

Taxonomies and Their Value in Formulating Objectives

Description

Taxonomies of educational objectives have been widely used to categorize and sequence objectives. According to Bloom and his associates (1956), performance objectives can be categorized as either cognitive, affective, or psychomotor in nature.

Cognitive: Objectives which deal with intellectual skills and the acquisition of knowledge

Affective: Objectives which deal with attitude change

Psychomotor: Objectives which relate to the acquisition of manipulative or motor skills

Based upon these domains, objectives have been classified according to taxonomic levels. In addition to providing clues for sequencing objectives, these taxonomic levels also provide insight into the type of learning skill required for each performance, so that appropriate evaluations and learning activities can be developed. The Figures 3-1 through 3-3 summarize these taxonomic levels for each of the three domains.

Instructors and instructional developers have found these taxonomies to be useful for:

- Developing comprehensive lists of objectives for particular subjects or entire curricula.
- Ensuring that objectives are specified for higher level skills as well as lower level skills.
- Sequencing objectives.
- Developing test materials and test item banks in relationship to objectives.
- Conducting research on the structure of learning outcomes.

FIGURE 3-1: HIERARCHY OF LEARNING OBJECTIVES COGNITIVE DOMAIN

Adapted from Bloom, B. S., Hastings, J. T., & Madeus, G. F. (1971). *Handbook of formative and summative evaluation of student learning*. New York: McGraw-Hill.

- Recall or recognition of knowledge
- Development of intellectual abilities and skills

LEVEL/EXAMPLES	DESCRIPTION
PREREQUISITES	
BEHAVIORAL TERMS	
MENTAL PROCESS	

				SYNTHESIS ABSTRACTIONS DESIGN COMMUNICATIONS
			ANALYSIS ORGANIZATION RELATIONSHIPS ELEMENT DISTINCTION	Breakdown of material into component parts
		APPLICATION APPLICATION	Use of abstractions in concrete situations	Use of abstractions in concrete situations
	COMPREHENSION EXTRAPOLATION INTERPRETATION TRANSLATION	Understanding of material being communicated	Understanding of material being communicated	Understanding of material being communicated
KNOWLEDGE FACTS & TERMINOLOGY CLASSIFICATIONS & TRENDS METHODOLOGY & CRITERIA THEORIES & PRINCIPLES	Recognition & retention of data, processes, & patterns	Recognition & retention of data, processes, & patterns	Recognition & retention of data, processes, & patterns	Recognition & retention of data, processes, & patterns
Defines, describes, identifies, labels, lists, matches, names, outlines, reproduces, selects, states	Converts, defends, distinguishes, estimates, explains, extends, generalizes, gives examples, infers, paraphrases, predicts, rewrites, summarizes	Changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses	Breaks down, diagrams, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, points out, relates, selects, separates, subdivides	Categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes
RECALL	UNDERSTANDING	RULE-USING		PROBLEM-SOLVING

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FIGURE 3-2: HIERARCHY OF LEARNING OUTCOMES AFFECTIVE DOMAIN

Adapted from Bloom, B. S., Hastings, J. T., & Madeus, G. F. (1971). *Handbook of formative and summative evaluation of student learning*. New York: McGraw-Hill.

HIERARCHY OF LEARNING OUTCOMES

AFFECTIVE DOMAIN

- Development of interest, appreciation, attitudes, values, and personal adjustment.

LEVEL/EXAMPLES	DESCRIPTION
PREREQUISITES	
BEHAVIORAL TERMS	
MENTAL PROCESS	

				INTERNALIZATION CHARACTERIZATION GENERALIZED SET
			ORGANIZATION ORGANIZATION CONCEPTUALIZATION	Evaluation of a value system
		VALUING COMMITMENT TO VALUE PREFERENCE FOR VALUE ACCEPTANCE OF VALUE	Appreciation of the worth of the concept as a value	Appreciation of the worth of the concept as a value
	RESPONDING SATISFACTION WILLINGNESS ACQUIESCENCE	Interest in the concept	Interest in the concept	Interest in the concept
RECEIVING CONTROLLED ATTENTION WILLINGNESS AWARENESS	Awareness of a concept	Awareness of a concept	Awareness of a concept	Awareness of a concept
Asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses.	Answers, assists, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes.	Completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works	Adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.	Acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, uses, verifies.
AWARENESS	INTEREST	APPRECIATION	VALUES	ADJUSTMENT

FIGURE 3-3: HIERARCHY OF LEARNING OBJECTIVES PSYCHOMOTOR DOMAIN

Adapted from Bloom, B. S., Hastings, J. T., & Madeus, G. F. (1971). *Handbook of formative and summative evaluation of student learning*. New York: McGraw-Hill.

- Ability to perform manipulative or motor skills

LEVEL/EXAMPLES	DESCRIPTION
PREREQUISITES	
MENTAL PROCESS	

				COMPLEX RESPONSE AUTOMATIC PERFORMANCE RESOLUTION OF UNCERTAINTY
			MECHANISM MECHANISM	Performance becomes habitual
		GUIDED RESPONSE TRIAL AND ERROR IMITATION	Initiation of performance	Initiation of performance
	SET EMOTIONAL SET PHYSICAL SET MENTAL SET	Preparation to perform an act	Preparation to perform an act	Preparation to perform an act
PERCEPTION TRANSLATION CUE SELECTION SENSORY STIMULATION	Awareness of the performance of an act	Awareness of the performance of an act	Awareness of the performance of an act	Awareness of the performance of an act
READINESS		ATTEMPTED	HABITUAL	MASTERY

Psychologist Robert Gagne (1985) has developed an alternative taxonomy to be used for sequencing objectives. His *categories of learning*, -- unlike Bloom's taxonomies -- are defined in observable performance terms. The table below shows how Gagne's eight categories relate to each other. The higher categories require mastery of the relevant lower ones.

TABLE 3-1: GAGNE'S CATEGORIES OF LEARNING

Category	Definition	Example
Motor skill	Performing a physical action	Word-processing a lesson plan
Verbal information	Stating facts, ideas, names, or generalizations	Describing the steps of instructional planning
Cognitive strategy	Managing one's own learning and thinking	Designing a course
Attitude	Acting according to one's feelings, beliefs, or opinions	Deciding to implement instructional planning
Intellectual skills	Demonstrating an ability to process information in complex ways	
- Concepts		Categorize objectives as general learning objectives or enabling objectives
- Rule		Show how assessment items are derived from learning objectives
- Problem-solving		Devise a set of activities to meet a learning objective

Adapted from Gagne, R. M., & Briggs, L. J., (1979). *Principles of instructional design*. New York: Holt, Rinehart and Winston.

Gagne's work goes beyond that of Bloom's by identifying the internal (learner readiness) and external (instructional) conditions that must be met in order for learning to take place (Romiszowski, 1981, p. 91). His taxonomy can be effectively used to sequence objectives and connect objectives to learning processes, thus providing a guideline for designing instruction that best suits the type of learning process involved.

Questions

How does Gagne's scheme compare to that of Bloom? In what ways are they similar? In what ways are they different?

Criticisms

Critics of objectives taxonomies raise the following issues regarding their use. It is up to you to draw your own conclusions as to their usefulness in organizing objectives and planning instruction.

- It is easy to confuse the learning objective with its observable behavioral indicator
- Goals that do not easily fit into the scheme are often omitted
- It may be unrealistic to separate process and content, as suggested by the taxonomic approach
- Treating objectives as isolated ends overlooks the interrelationships between them
- The separation among cognitive, affective, and psychomotor domains is artificial

- The essential characteristics of an educated person, i.e., comprehensive understanding, is lost in the process-oriented approach inherent in taxonomies
- The hierarchy of behaviors represented in the taxonomies may be suspect

Questions

Have you ever used taxonomies to organize objectives? If so, would you recommend their use? Why or why not?

Sources of Objectives

Process

Where do objectives come from? How does one decide whether a particular skill becomes an objective or not? In other words, what is the process for deriving objectives?

In general, objectives are derived from broad outcome competencies which are in turn derived from even broader societal and/or institutional goals. The competencies identify what the educator expects the learner to be able to do after instruction is completed. To derive the objectives from the competencies, the trainer or instructor must go through a two-step analytical process:

Step 1: Competency Analysis: The competencies are broken down into their component behaviors.

Step 2: Instructional Analysis: The component behaviors and subject content are analyzed to determine what the student must do to demonstrate the ability to perform the component behaviors.

The instructional analysis yields the general learning objectives (GLOs) which are in turn analyzed to derive the enabling objectives (EOs). It is the enabling objectives which give evidence of the student's ability to perform the GLOs. The entire process is graphically represented in Figure 3-4 and in the example provided in Table 3-2.

FIGURE 3-4: SOURCES OF OBJECTIVES

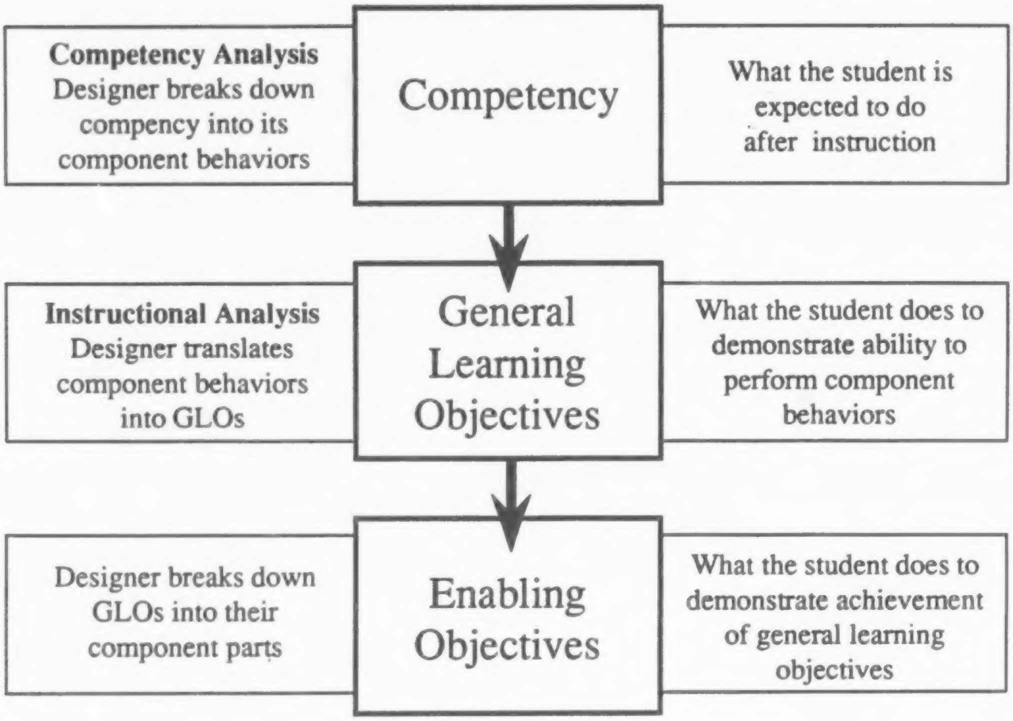
Competency Analysis
Designer breaks down compency into its component behaviors
Competency
What the student is expected to do after instruction
Instructional Analysis
Designer translates component behaviors into GLOs
General Learning Objectives
What the student does to demonstrate ability to perform component behaviors
Designer breaks down GLOs into their component parts
Enabling Objectives
What the student does to demonstrate achievement of general learning objectives

TABLE 3-2: DERIVATION OF OBJECTIVES

Reprinted by permission from Gronlund, N. E., (1985). *Stating objectives for classroom instruction* (3rd ed.). New York: Macmillan.

Competency - Writes Effectively in the Workplace

GLOs				
1. Composes effective memo, letters, and short reports.	2. Implements the three phases of the writing process.	3. Uses effective word choice.	4. Uses effective sentence structure.	5. Uses effective paragraph structure.
EOs				
1. Selects the proper memo, letter, and short report format.	1. Uses pre-writing techniques including brainstorming analysis of purpose and audience, and outlining.	1. Uses concrete nouns and verbs.	1. Uses active voice in most sentences.	1. Writes topic sentences.
2. Selects an appropriate organizational structure.	2. Writes rough drafts on the basis of an outline.	2. Uses active verbs.	2. Avoids possible voice, except when appropriate.	2. Includes sufficient and relevant support for topic sentences.
3. Satisfies a stated writing purpose by including relevant content and an appropriate tone.	3. Revises rough drafts to produce a final version.	3. Selects appropriate level of diction for the writing situation.	3. Uses coordination and subordination when necessary.	3. Includes only the main idea in a paragraph.
		4. Avoids jargon, wordiness, and redundancies.	4. Varies sentence structure.	4. Uses transitional devises effectively.

Application

The following exercise provides practice in performing a competency and instructional analysis.

1. Select a curricular competency from your own field of expertise. Then perform a competency analysis by breaking it down into its component behaviors.
2. Translate those component behaviors into general learning objectives. List your GLOs.
3. Analyze each GLO by breaking it down into its component parts. Then, translate these component parts into enabling objectives. List the enabling objectives for each of the GLOs that you listed in #2 above.

Resources

Because developing objectives can be time-consuming, you might consider drawing from collections of preformulated objectives that may be modified to meet your specific needs. The following resources provide such collections of objectives (Kemp, 1977):

Instructional objectives: A national compendium. State of Florida, Department of Education, Tallahassee, FL 32304.

Instructional objectives exchange. (IOX) Box 24095, Los Angeles, CA 90024.

Directory of measurable objectives sources. (DIMOS) Director of Research, Educational Commission of the States, 1860 Lincoln St., Suite 822, Denver, CO 80203.

Techniques for Writing General Learning Objectives

Procedure

After completing the competency and instructional analysis, you should be able to write the general learning objectives. The following guidelines will assist you in writing objectives that are most effective in facilitating learning.

- State the general learning objective as a product
- Describe student, not teacher performance
- Select the appropriate level of generality
- Begin GLOs with verbs

Technique

State the general learning objective as a product

The first guideline in writing such objectives is to remember to state the GLO as a learning product and not as a learning process (Gronlund, 1985, p. 9).

Examples

Product: Applies basic principles of accounting.

Process: Gains knowledge of basic principles of accounting.

Technique

Describe student, not teacher performance

This technique can best be shown by way of example.

Example

Student performance: Interprets lyrical poetry.

Teacher performance: Increases ability to interpret lyrical poetry.

Technique

Select the appropriate level of generality

The general learning objective is by its very nature a broad statement which will later be broken down into lower level enabling objectives. However, it should should not be stated in such overly general terms that it does not give a clear direction.

Examples

Too broad: Communicates effectively in Spanish

Too specific: Conjugates verbs accurately in Spanish

Appropriate: Writes effectively in Spanish

Technique

Begin GLOs with Verbs

Begin all general learning objectives with verbs rather than with phrases such as "The student will..." The selection of an appropriate verb will help you to phrase the GLO at an appropriate level of generality -- specific enough to provide direction for instruction without being trivial. Some of the most common verbs to be used in general learning objectives include (Gronlund, 1985, p. 73):

Examples

Analyze
Apply
Appreciate
Comprehend
Compute
Create
Demonstrate
Evaluate
Interpret
Know
Listen
Locate
Perform
Recognize
Speak
Think
Translate
Understand
Use
Write

Application

Read through the following statements of general learning objectives. If a statement is properly written, label it "OK." If not, explain what is wrong with the statement.

Increase the student's awareness of the importance of learning.

Proposes a plan for an experiment.

Effectively manages an office.

Understands basic statistical concepts.

The student will interpret data in scientific reports.

Techniques for Writing Enabling Objectives

Procedure

Enabling objectives describe a sample of those behaviors that are essential to the achievement of the general learning objective. They describe behaviors which are typically at a lower taxonomic level, and assist in the identification of learning activities that cumulatively facilitate achievement of the general learning objective.

To determine the enabling objectives, analyze the general learning objective by asking yourself what the learner needs to be able to do in order to demonstrate achievement of the GLO. The enabling objectives represent a sample of component parts of the skill specified in the GLO.

Examples

GLO 1: Selects decision strategies appropriate for specific managerial situations.

EO 1: Distinguishes among strategic, administrative, operational, situational, personal, and organizational decisions.

EO 2: Categorizes decisions according to the type of condition in which the decision must be made.

EO 3: Lists the nine steps of one decision-making process.

The following are guidelines for writing effective EOs (Gronlund, 1985, p. 22).

- Begin each EO with a verb that specifies an observable performance and conveys instructional intent.
- List EOs that are relevant to the GLO and represent a sample of essential component behaviors.
- Do not list the conditions of assessment or performance standards. (These statements can be added at the time of writing test items.)

Article

Additional suggestions for writing objectives can be found in the following article by Dodge. Read this article, which is reprinted at the end of the module. Then return to this page to answer the questions that follow.

Dodge, R. E. (1987, November/December). Guide learning with objectives that take a student's perspective. *Performance and Instruction Journal.*

Application

Read through the following statements of GLOs and EOs. If a statement is properly written, write "OK." If not, explain what is wrong with the statement.

GLO Analyze given situations to determine the type of power exemplified in each.

EO 1 Identify methods for developing power.

EO 2 The relationship between power and leadership style.

EO 3 Identify different types of power.

EO 4 Define and describe power.

GLO Evaluate planning and budgeting procedures.

EO 1 The student will describe how to prepare a budget.

EO 2 Types of budgets.

EO 3 List various organizational structures.

EO 4 Identify the components of planning.

EO 5 Analyze the cost benefits of a proposal in order to project expenses.

Refining Your Objectives

Procedure

Once you have generated GLOs and EOs, the next step is to review and edit your work. During the editing phase you should:

- Check for appropriate level of generality in both the GLO and the EO.
- Combine related objectives.
- Eliminate redundant or irrelevant objectives.
- Eliminate wordiness and overuse of prepositional phrases in the writing of objectives.
- Establish a list of objectives which represent entry level skills and separate these from course objectives.
- Sequence the objectives.

During the editing phase, you should review both the GLOs and the EOs based upon your knowledge of student characteristics and determine which objectives represent knowledge or skills considered too basic for instructional treatment. These objectives may then be translated into course prerequisites or entry level behaviors. Pre-testing is another way to support your assumptions about which objectives constitute prerequisite skills.

Sequencing the objectives can be helpful in creating a course structure and in developing appropriate learning activities. Bloom's or Gagne's taxonomies can be used as a basis for creating a hierarchy of objectives. In most cases, the preferred sequence will be based upon one of the following progressions of content or behaviors:

- simple to complex
- concrete to abstract
- specific to general

- past to present
- obvious to unexpected
- problem-oriented to solution-oriented
- minimum personal relevance to maximum personal relevance
- lower-level learning outcomes to higher-level learning outcomes

Application

Based upon the competency and instructional analysis you performed earlier, complete the following:

1. Edit the objectives you devised by:
    - Checking for appropriate level of generalizing.
    - Combining related objectives.
    - Eliminating redundant or irrelevant objectives.
    - Eliminating wordiness and overuse of prepositional phrases.
2. Then, identify those objectives which represent entry level skills.
3. Sequence your objectives by using one of the schemes listed above.

Application

In view of what you have learned in this module, consider applying the guidelines on formulating objectives to a lesson or course you are currently teaching. Begin by thinking through the aim of your instruction; i.e., what outcome competencies you expect of the learner. Then try to translate those competencies into general learning objectives and enabling objectives as you learned to do in the module. Review and edit your list, identifying all prerequisite behaviors, and sequence the objectives in a logical progression of your choosing.

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Dodge, R. E. (1987, November/December). Guide learning with objectives that take a student's perspective. *Performance and Instruction Journal*. Reprinted with permission.

Chapter 6

Relating Objectives to Classroom Instruction

The final list of instructional objectives usually contains some learning outcomes that are considered essential for all students to achieve and others that allow for varying degrees of individual development. In arithmetic, for example, we might expect all students to know the multiplication table, but we anticipate considerable variation in the ability of students to solve problems requiring arithmetical reasoning. Similarly, we may consider it essential for all chemistry students to know the formulas of the chemical compounds studied, but we can expect wide variation in their ability to apply scientific principles to new situations. Learning outcomes that are considered *minimum essentials* are typically low-level outcomes that can be rather easily achieved by students and that serve as prerequisites to further learning in the area. Those outcomes at the *developmental level* represent goals toward which students may show different degrees of progress but which they never fully achieve. The ability to understand, to apply, to interpret, and to think critically, for example, typically depend on an extended period of development. Their complete attainment is not expected in any given course. All we can expect is to define each objective in terms of those behavioral outcomes that are appropriate to the students' learning levels and that represent reasonable degrees of progress toward the goal.

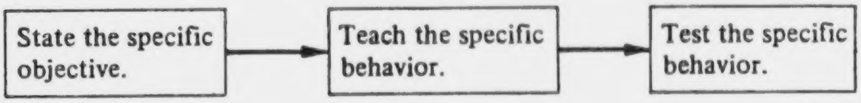
Failure to distinguish between instructional objectives that are considered minimum essentials and those that encourage maximum development has caused considerable confusion in both teaching and testing. Some teachers tend to treat all objectives as minimum essentials and to strive for mastery on the part of all students. Where this is done, the more simple learning outcomes are stressed, teaching and testing tend to focus on very specific aspects of behavior, and an attempt is made to keep all students learning at the same pace. In contrast to this approach, some teachers stress objectives at the developmental level only. They put so much emphasis on these more complex learning outcomes that they neglect the knowledge and skills that are prerequisite to a higher order of learning. To avoid these extremes, you should give consideration to both types of objectives when you prepare the list of teaching goals, and you should use teaching and testing procedures that accommodate both types of learning outcomes.

Teaching and Testing at the "Minimum Essentials Level"

The teaching emphasis at the *minimum-essentials level* is on shaping and modifying student behavior to fit a predetermined and clearly defined minimum level of performance. The learning outcomes are generally very specific and call for simple, independent responses. In fact, the objectives are frequently stated as tasks to be performed rather than as goals to work toward. Thus, we might have statements like the following:

Adds single-digit whole numbers.
Identifies symbols used on weather maps.
Defines basic terms of unit.
Identifies parts of the microscope.

Such simple and clearly defined tasks make it possible to have a one-to-one relation between the stated objective, the teaching procedure, and the testing procedure. As illustrated in the following diagram, the specific objective is stated, the specific behavior is directly taught, and the specific behavior is directly tested.


State the specific objective.
Teach the specific behavior.
Test the specific behavior.

(e.g., Adds single-digit whole numbers.)

(e.g., Demonstrate and provide practice in adding single-digit whole numbers.)

(e.g., Present problems requiring addition of single-digit whole numbers.)

This is the model used in programmed learning and in teaching at the training level. It is also the one stressed by Mager (1962). This model is very useful for illustrating the direct relationship between objectives, teaching, and testing in the learning of minimum essentials; that is, in those areas of learning where the desired outcome is to make all students perform alike at a specified minimum level. This model is inappropriate, however, for teaching and testing at the developmental level, as we shall see shortly.

Standards of performance are most frequently specified in the learning of minimum essentials. These standards may indicate that complete or nearly complete mastery is expected. Thus, a student may be expected "to identify *all* of the parts of a microscope," "to define *eight out of ten* terms," or "to solve *ninety per cent* of the computational problems." Such standards are easily specified at this level because the learning outcomes are specific, independent, and easily defined.

Although stating the standards for a minimum level of performance is a simple process, determining what the standards should be is not. On what basis do you decide that a student should be able "to define *eight out of ten* terms"? Why shouldn't he have to define seven, nine, or all ten? There is little evidence to support particular standards of achievement in the various subjects at different grade levels. Each teacher must depend on his own arbitrary judgement–based on the difficulty of the material, the nature of the student group, and the learning conditions that exist. Although such standards can provide rough guidelines for determining the extent to which a minimum level of performance is being achieved, you must always keep in mind that the standards are arbitrarily set and therefore highly tentative.

Teaching and Testing at the "Developmental Level"

The teaching emphasis at the *developmental level* is on encouraging each student to progress as far as possible toward predetermined goals. The instructional objectives here are typically more general than those at the mastery level. Rather than being stated as specific tasks to be performed, each objective represents a whole class of responses. Thus, the objectives provide direction for both the teacher and the student, without being overly restrictive with regard to the nature of the instruction or the types of learning activities to be engaged in by the student. They allow for an openness and exploration in the teaching-learning process that is absent in the closely prescribed shaping and molding process characteristic of the teaching of minimum essentials.

Because each instructional objective at the developmental level represents a large class of specific responses, all we can expect to do in defining each objective is to list a reasonably adequate *sample* of the desired types of behavior. This process was described in Chapter 3 and is illustrated as follows:

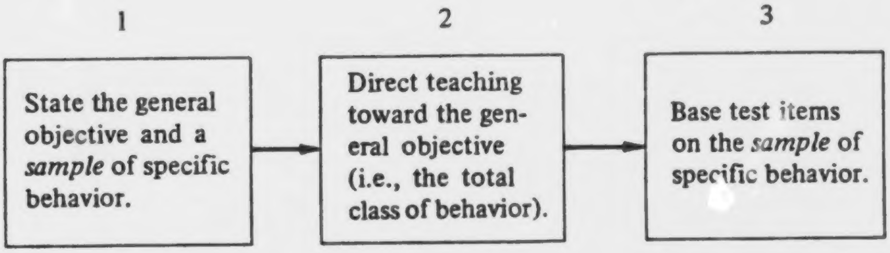
Understands scientific principles.

1. States the principle in his own words.
2. Gives an example of the principle.
3. Identifies predictions that are in harmony with the principle.
4. Distinguishes between correct and incorrect applications of the principle.

The four specific types of behavior listed under this objective help clarify what is meant by *understands scientific principles*, but these are just four of the numerous ways that *understanding* might be shown. Therefore, these four specific types of behavior are representative of the variety of behavior that could describe the general objective. Because we are able to list only a sample of the types of behavior we are interested in, these specific types of behavior are not expected to be taught and tested on a one-to-one basis. In fact, were this method to be followed, learning would be of a rote nature, and responses could not be used as evidence of *understanding.* For example, if we were to teach a student to "state a principle in his own words" and later ask him to "state the principle in his own words," his response would represent nothing more than the *recall* of previously learned material. The same would hold true for the other three specific types of behavior. If all types of behavior were taught in this manner, we would be functioning at a simple recall level, and the usefulness of the sample of behavior as an indication of *understanding* would be destroyed. That is, the students would be able to demonstrate the types of behavior included in the sample (in a rote manner) but would not be able to demonstrate the other types of behavior also encompassed by the same instructional objective.

Teaching at the developmental level must be directed toward the general instructional objective and the total class of responses that it represents. The list of specific behavior is mainly useful in providing an operational definition of the goal and in providing guidelines for test construction.

The relation of teaching and testing to the objectives at the developmental level is illustrated as follows:


1
2
3
State the general objective and a *sample* of specific behavior.
Direct teaching toward the general objective (i.e., the total class of behavior).
Base test items on the *sample* of specific behavior.

It will be noted in this diagram that the sample of specific behavior that is identified in step 1 can also be used as a basis for developing the test items in step 3. In measuring such complex learning outcomes as understanding, however, the test items should go beyond what has been directly taught in step 2. In giving examples of a principle, for instance, the students should be required to give new examples (i.e., examples not discussed in class). Similarly, the application of principles should be concerned with new situations, and the interpretation of data should be based on data new to the students. It is only when the test items contain some novelty that we are able to go beyond the simple recall level of learning and to measure the more complex learning outcomes.

At the developmental level of learning where *maximum achievement* is the goal, useful standards of performance are extremely difficult, if not impossible, to define. Thus, it is usually necessary to describe test performance in relative terms; that is, in terms of where a given test score falls in some particular group. This may be a classroom group or, as in the case of standardized tests, a national group. In either instance, however, the test score indicates a relative level of achievement only; therefore, the nature of the group must be taken into account when you interpret the score.

A summary of some of the major differences between teaching and testing at the minimum-essentials level and at the developmental level is presented in Table VI.

TABLE VI. Summary Comparison of the Relation of Objectives to Teaching and Testing at Two Different Levels of Instruction

	Minimum Essentials Level	*Developmental Level*
Teaching Emphasis	Shape and modify student behavior to fit a predetermined *minimum level of performance.*	Encourage and direct each student toward the *maximum level of development* he is capable of achieving.
Nature of the Objectives	Limited, specific, and completely defined tasks to be performed.	General goals that provide direction and are defined by a *representative sample* of specific behaviors.
Relation of Teaching to the Objectives	Teaching is directed toward the specific behavior stated in the objective. Each *specific behavior* is taught on a one-to-one basis.	Teaching is directed toward the *general class of behavior* that the objective represents, rather than toward the behavior listed in the particular sample.
Relation of Testing to the Objectives	Each specific behavior is tested directly on a one-to-one basis. Test items require students to demonstrate responses identical to those learned in class.	Only a *sample* of specific behavior is tested for each objective. Test items require students to demonstrate previously learned responses in situations containing some novelty.
Specifying Performance Standards	Standards of minimum performance are easily specified, but they are usually set in an arbitrary manner.	Performance standards are difficult to specify. Achievement is typically reported in terms of *relative* position in some known group.

Using Objectives in Instructional Planning

The final list of objectives for a particular course or unit of work specifies the learning outcomes that are to result from the instruction. As we have noted, some of these outcomes will indicate behavioral changes required of all students, and some will indicate goals toward which varying degrees of progress can be expected. In any event, these objectives constitute the learning outcomes that are considered to have the greatest value for the students; therefore, they provide a sound basis for instructional planning. To be most effective, of course, the instructional objectives should be identified and defined before other instructional plans are made. When both the methods and materials of instruction and the procedures for evaluating student progress are selected in light of the desired learning outcomes, we can expect them to be more relevant and more effective.

One way to ensure that the instructional objectives, the teaching methods, and the evaluation techniques will be in harmony is to prepare a planning chart that includes all three. The two examples in Table VII, the first at the minimum-essentials level[4] and the second at the developmental level, illustrate the procedure for preparing a planning chart.

In using a planning chart, you must take care to prevent instruction from becoming subdivided into a series of separate teaching acts. The chart makes clear the relationship between the teaching methods, the evaluation techniques, and the desired learning outcomes, but you must not infer that each objective should be worked toward separately. *Knowledge of literary terms,* for example, may receive direct attention early in the instruction, but this is a goal to work toward throughout the course. Similarly, when students work on the *interpretation of literature,* they would also give attention to specific facts concerning the literary work, to speaking and writing skills, to an appreciation of literature, and so on. In classroom instruction, we typically work on a number of different learning outcomes at the same time. What the chart does is provide an overall plan to assure that each objective will receive the proper share of attention in the instructional process and that the methods of teaching and testing will be more relevant to the attainment of the desired learning outcomes. The chart, therefore, serves as a guide for our daily lesson planning. In these daily lesson plans, we can provide for the desired integration of the learning experiences and for their placement in proper sequence.

In summary, instructional objectives include some learning outcomes that can be considered minimum essentials and others that encourage the maximum development of the student. Most classroom instruction includes objectives of both types. A clear distinction between the types should be made because each type requires a different teaching and testing emphasis. Instructional planning is enhanced if the instructional objectives are identified first. This procedure provides greater assurance that the methods and materials of instruction and the evaluation techniques are appropriate for achieving the desired learning outcomes. An instructional planning chart, which provides a useful guide for daily lesson planning, can be used to relate these various aspects of instruction.

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[4] Although it would be possible to list only the specific learning outcomes at this level, the statement of a general objective provides for uniformity in the final list of instructional objectives.

TABLE VII. Instructional Planning Chart

Instructional Objectives	*Teaching Methods*	*Evaluation Techniques*
Knows literary terms 1. Gives textbook definitions 2. Identifies examples in a literary selection 3. Uses the terms correctly in oral and written work	Encourage students to make a "literary dictionary" and to review the definitions periodically. Point out, and ask students to point out, examples during oral reading. Give oral and written assignments requiring use of the terms.	1. Short-answer test 2. Multiple-choice test 3. Observation and evaluation of written work
Interprets literary works 1. Identifies the major and minor themes 2. States the author's purpose or message 3. Identifies the tone and mood 4. Explains why the characters behave as they do 5. Points out specific parts of the literature that support the above interpretations 6. Relates the literary work to other writings	Read a brief literary work to class. Lead off discussion with questions concerning theme, author's purpose, tone, and character development. Analyze the parts of the literary work and show how they support the general interpretations. Generalize the method of analysis and interpretation by applying it to a second work. Have students select a literary work and write a critical analysis and interpretation.	Observation during class discussions. Objective test on specific points in a literary work and on the process of literary analysis. Essay questions calling for interpretations and supporting evidence. Evaluation of students' written reports (using criteria of effective interpretation).

Have Learning Begin with Your Lesson Objectives:

Guide Learning with Objectives that Take a Student's Perspective

by Ronald E. Dodge

What am I going to be able to do after I finish this lesson? This is a question every lesson objective should be able to answer. So, if a lesson has objectives, there should be no problem finding out what the lesson is about. Right?

Well, not always. When you look at the way some objectives are written, it seems that they exist only because they're "supposed" to be somewhere. After all, haven't we learned that "lessons need to begin with objectives"?

Some people believe this, so when they write a lesson, they make sure they have objectives. It doesn't matter if anyone will ever read them. They're there because they're supposed to be. It's the correct thing to do.

Well, it's true: Lessons do need objectives. But beginning them with objectives doesn't guarantee that the objectives are going to do anything useful, that they are going to guide any learning, or that they are even going to be read.

To have learners pay attention to them, objectives need to be written from the learner's perspective. They need to be written so that they clearly tell people what they are going to be able to do. If they are written this way, they will be read, they will serve a purpose, and they will become useful to the learner. It's as simple as that. Well, how do we get useful objectives? And how does this differ from what we've been told all along?

A Well-Written Objective

Exactly what is a well-written objective? We've been taught that an objective has three parts:

1. A statement of *givens* to let students know what will be available to them when they begin.
2. A measurable *behavior* or action – something learners do that can be observed.
3. *Criteria* which specify exactly what constitutes successful completion of that action.

With all these components in place, there should be no problem for anyone reading the objective. Right?

Well, again, not exactly. Unfortunately, some trouble can, and often does, occur. It begins when the writers of objectives leave out *the* important ingredient: a student perspective. What happens is that objective writers forget to consider the student's point of view as they try to write an objective that includes all the givens, behaviors, and criteria. This often results in something that's difficult to understand.

Here's one example:

> Given a problem with a modem interface and the appropriate documentation, the student will be able to correctly perform the steps necessary to troubleshoot the malfunction to a failing circuit board so that, after replacing the failing board, a "pass complete" indication may be obtained from diagnostic software.

This objective contains the three parts every good objective should have. From an academic standpoint, it appears sound. It certainly describes something someone is supposed to do. But the problem is that it's hard to understand. Even though it has all the proper components, it fails to serve the needs of a learner. It fails to guide learning.

The problem with our example is that the behavior to be learned is buried within the wording of the objective. Somewhere between what is stated as a given and what is specified as criteria, is a behavior someone is supposed to accomplish. It didn't get buried intentionally. It was something that happened as the writer of the objective concentrated on constructing a good, three-part objective. The person just thought more about getting the three parts together than describing a behavior to be learned.

Take another look at the objective used in our example. It's one you might actually find being used in computer training. What does it say? Well, after several readings, it becomes apparent that it has to do with troubleshooting a modem interface problem. (A modem interface is part of a computer communication system.) The desired behavior is to find a circuit board that's causing the interface to fail and replace it. To

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start out, students will be given the problem and the documentation they need to locate it. The criteria for demonstrating that the interface has been successfully fixed is to run diagnostic software and get a "pass complete" indication.

All this was interpreted after several readings and a little head scratching. This involved more time than the average student would probably want to invest. (Most would rather do better things like get on with the lesson at hand.)

Rules for Better Objectives

What follows, then, are seven rules to help you avoid problems like this. These guidelines will not only help you write better, more understandable objectives, but they will also help you develop a learner-orientation toward objective writing. Instead of first considering the basic elements of an objective and then writing accordingly, these guidelines will have you first consider how to convey a desired behavior to someone – and then write accordingly.

Let's see how.

Because we are interested in writing an objective from a learner's perspective, how about taking out the phrase "the student will be able to"?

Rule 1: Drop the phrase, "the student will be able to."

This may, at first, seem inconsistent. If we are trying to adopt a student perspective, why should we take out the reference to students? Well, by doing so, the objective begins to sound more like a direction and, therefore, begins to provide direction. It gets away from dealing with a "third person." Instead, it tells you what *you* are going to do.

This is the result:

> Given a problem with a modem interface and the appropriate documentation, correctly perform the steps necessary to troubleshoot the malfunction to a failing circuit board so that, after replacing the failing board, a "pass complete" indication may be obtained from diagnostic software.

Good. We are beginning to get some direction. Now, let's try something else.

Rule 2: Define normal or "given" conditions at the start of the training.

If it's normal that appropriate documentation will always be provided for each performance, then it's only necessary to specify the exceptions to this rule – the times, for example, when the documentation won't be made available. It's sufficient to explain to students when they start training that they will always have the documentation they require – unless an objective tells them otherwise.

Once we do this, people start paying more attention to objectives:

> Given a problem with a modem interface, correctly perform the steps necessary to troubleshoot the malfunction to a failing circuit board so that, after replacing the failing board, a "pass complete" indication may be obtained from diagnostic software.

This sounds better, but there's still a lot that may be done to improve the objective.

Rule 3: There is nc need to specify that things should be done "correctly."

It should be understood that the objective needs to be completed correctly or successfully. After all, it doesn't make sense to try to do something incorrectly or unsuccessfully. Otherwise, why do it at all?

This gives us:

> Given a problem with a modem interface, perform the steps necessary to troubleshoot the malfunction to a failing circuit board so that, after replacing the failing board, a "pass complete" indication may be obtained from diagnostic software.

Not bad, but it's still awfully wordy.

Rule 4: Use as few words as possible.

"Perform the steps necessary" is a phrase that is unnecessary and can simply be left out. Scrutinize the words you use in objectives as if you had to personally pay for them.

> Given a problem with a modem interface, troubleshoot the malfunction to a failing circuit board so that, after replacing the failing board, a "pass complete" indication may be obtained from diagnostic software.

Rule 5: Translate words of many syllables into words of fewer syllables

It's amazing what can be accomplished with simple language. "Troubleshoot the malfunction" can be translated into: "Find and replace the failing circuit board."

We now have:

> Given a problem with a modem interface, find and replace the failing circuit board so that a "pass complete" indication may be obtained from diagnostic software.

So far, so good. This is almost fun.

Rule 6: Begin every objective with an action verb.

The trouble with putting the word "given" at the start of an objective is that it tends to act as another obstacle for anyone reading it. It's something that has to be read through or around until the action verb is finally reached. After dropping the given, we are left with an objective that gets to the point a lot sooner. It immediately tells people what they are going to do. It begins with the expected behavior. No waiting.

This is what we get:

> Find and replace the failing circuit board in a modem interface so that a "pass complete" indication may be obtained from diagnostic software.

Now, that's nice and clear. But it may still be a little too much to swallow all at once.

Rule 7: If necessary, use more than one sentence to write the objective.

No one ever said that objectives had to be written as one sentence. In fact, two (or three) simple sentences are better than one long, complex sentence. In our example, a second short sentence can be used to specify the criteria:

> Find and replace the failing circuit board in a modem interface. Obtain a "pass complete" indication from diagnostic software.

Nice!

So there you have it: an objective that is clear, and concise. Because it is written as an instruction, it helps begin the instruction. It gives direction to learning. And, isn't that what objectives are supposed to do?

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Module 4

Assessing the Outcomes of Instruction

–Assessments and Their Functions
–Choosing an Appropriate Assessment Method
–The Performance Examination
–The Essay Examination
–The Objective Examination
–Quality Control for Test Development
–Alternatives to Traditional Assessment Strategies
–Evaluating Assessment Results
–Using Evaluation Results
–References
–Reprints

Assessing the Outcomes of Instruction

Preview

Traditionally, assessments have been a method for determining if learners have mastered the course content. In systematic instructional development, however, assessments assume a more pivotal role: their development can be used to refine the course objectives and to guide instruction.

The subject of assessment has taken on new importance as institutions of higher learning prepare to implement mandated outcomes assessment programs. In this module, you will review the different approaches to assessment, their purposes, and how to systematically create items for each approach.

Goals

In this module, you are invited to:

- Explore different types of assessment and their purpose
- Identify situations where pretesting is appropriate
- Compare and contrast various assessment methods
- Develop sample test items for some of these approaches
- Investigate alternatives to traditional assessment methods
- Compare criterion-referenced and norm-referenced approaches to grading

Assessments and Their Functions

Definitions

Before beginning a discussion about assessment methods and testing strategies, it is important to distinguish between key terms. For the purpose of this module, *tests* or *examinations* will refer to specific types of measurement tools, such as essay examinations or performance tests. These tools, in conjunction with nontraditional testing techniques such as interviews and classroom observations, constitute *assessment methods*. They are to be distinguished from *evaluation methods*, which refer to the strategies used to assign value to assessment outcomes (i.e., grading schema).

Purposes

The primary purpose of any assessment is to measure learner achievement of specific objectives. In addition, assessments may have the following instructional uses:

Selection: The screening examination is used to separate those learners who are most likely to succeed in an instructional program from those who most likely will not.

Placement: The placement examination helps learners decide which instructional pathway to take or where to begin in the program.

Diagnosis: Diagnostic tests help the learner determine areas of strength and weakness so that pacing, enrichment, or remediation options can be properly utilized.

Assessment may be administered either before (*pretest*) or after (*posttest*) instruction has taken place. The most common type of assessment is the posttest. Various types of posttests, their purposes, and guidelines for their construction are presented later in this module.

As a pretest, the assessment can determine whether or not the students have mastered the prerequisite (entry level) behaviors and how much they already know about the general learning objectives and enabling objectives to be mastered in the course.

Article

To learn more about the use of pretesting read the following article, reprinted at the end of the module. Then return to this page and answer the questions below.

Yelon, S. (1985, November). Making decisions about pretesting: It's not a simple matter. *Performance and Instruction Journal.*

Questions

In what situations is pretesting of learners especially valuable? Why?

Questions

Do you agree that a pretest for a given course should include measures of entry level competencies as well as measures for the course objectives? Why?

Choosing an Appropriate Assessment Method

Procedure

The choice of assessment method should be based on an analysis of the general learning objectives and their accompanying enabling objectives. Based upon Gronlund (1985) and Cyrs (1977), the following method can be used to develop an assessment strategy which samples the universe of possible objectives and the level of performance required.

1. State the general learning objectives and define each objective according to the level of expected performance.

2. Prepare a chart which indicates the level of expected performance for each objective and shows how many items will be assigned to it (see following page). The amount of items devoted to a particular objective should reflect the emphasis which the objective is being given in the course.

3. Prepare a sample of the type or types of test items to be used.

4. Construct test items to measure the sample of student performance as designated in the chart.

The most common types of examinations selected for assessment purposes are listed below. Each has its own unique advantages and limitations, and is described in detail on the following pages.

- Performance examination

- Essay examination

- Objective examination

  - multiple-choice
  - true-false
  - matching
  - short answer completion

FIGURE 4-1: SAMPLE FORM FOR SELECTING ASSESSMENT ITEMS

LEVEL OF PERFORMANCE EXPECTED

COURSE OBJECTIVES	KNOW.	COMP.	APPL	P-S.	TOTAL

KNOW = KNOWLEDGE
COMP = COMPREHENSION
APPL. = APPLICATION
P-S = PROBLEM-SOLVING

The Performance Examination

Purpose

The performance exam requires the learner to complete a job task or series of tasks under controlled conditions. Although the performance is primarily nonverbal, the learner may be required to provide verbal explanations in the course of the assessment. Evaluation may be based on absolute or variable mastery of the performance required.

Advantages

The performance examination:

- measures performance as it will take place in the real world.
- can provide valuable feedback to the learner regarding performance.

Limitations

The performance examination:

- must usually be administered on an individual basis and these are costly.
- may sacrifice authenticity to accommodate time, budget, or circumstantial constraints.
- usually includes test elements that are interdependent, allowing overall performance to be affected by success or failure in specific areas.

Guidelines

To prepare the performance examination:

1. The demands of the test situation should approximate as closely as possible the demands of the performance when completed in the real world.
2. The test should be designed so that it measures "doing" and not simply "knowledge about doing."
3. Test elements should be sequenced to represent the manner in which the task is performed on the job.
4. Performance measures and proficiency levels should be clearly specified before administering the test: speed, accuracy, etc. must be taken into account.
5. When evaluating performance test results, learner effort must be distinguished from learner performance.
6. The learner should have a clear idea of what she/he is expected to do.

The Essay Examination

Purpose

The essay examination is used when the learning outcomes involve more than the recall of knowledge, and/or achievement cannot be measured by objective methods. Also, writing skills of the learner should be well-established before selecting this option.

Advantages

The essay examination:

- provides an opportunity for the learner to demonstrate initiative and writing skills as well as the ability to select the information called for.
- allows the learner to express feelings and attitudes.
- largely eliminates the possibility of guessing.
- is relatively easy to prepare.

Limitations

The essay examination:

- allows some learners to "bluff" their way through questions they are not prepared for.
- may be difficult to evaluate as performance is influenced by handwriting, spelling, punctuation, and vocabulary.
- is generally unreliable, subject to biases such as:
  - the halo effect (high performance in one area is generalized to other areas)
  - the leniency effect (all learners are rated generally higher)
  - the central tendency effect (all learners are rated about the same)
- limits the number of questions that can be asked and the amount of content that can be sampled.
- is usually difficult and time-consuming to grade.

Guidelines

To prepare the essay examination:

1. Essay questions should be designed to represent as broad a sampling of performance objectives and content as possible. However, avoid ambiguity or excessive breadth in any one question.

2. The essay question should be structured so that the learner must be specific in his or her response. State clearly whether knowledge or attitude is required to avoid responses that confuse opinion with the application of organized facts.

3. Performance expectations should be made clear before administering the exam, including:

    - the point or percentage value of each question.

    - the approximate amount of time that should be devoted to answering each question.

    - the importance of clarity, spelling, grammar, punctuation, and organization on evaluation.

4. A model for each response should be prepared for each question before administering the examination.

5. All learners should be required to answer the same questions in order to increase exam reliability. Don't allow students to select their own questions.

6. When grading the essay examination:

   - Grade all responses to a single question before going to the next question. This enables the evaluator to keep in mind the criteria for judging each question and doesn't bias the scoring of an entire paper from the one response.

   - If possible, arrange for independent grading by another evaluator.

   - Do not confuse style with content.

   - If possible, provide useful written feedback.

   - If a point system is used by the evaluator to judge each part of a response, make certain that only gross scores are recorded.

The Objective Examination

Purpose

The objective examination is particularly useful when a relatively large amount of content must be sampled to adequately assess performance. Although time-consuming and difficult to construct, the trade-off provided by the objective exam is that it is usually easier to score. These exams are well adapted to assessing cognitive skills, particularly recall of knowledge, and are generally inadequate for assessing affective and psychomotor skills.

Advantages

The objective examination:

1. tends to be very reliable.
2. allows more content to be sampled in the time that it takes to complete other kinds of exams.
3. reduces the scoring bias based on written or verbal communication skills rather than performance.
4. allows for quick and easy scoring.

Limitations

The objective examination:

- can be time-consuming and difficult to construct depending on the levels of skill being assessed.
- places a greater emphasis on rote learning and test-taking skills.
- tests recognition, rather than recall.
- cannot effectively test for creativity, opinion, organization of ideas, or psychomotor skills.

Types of Items

Objective examinations may include any one or all of the following types of items. Their descriptions follow.

- multiple-choice
- true/false
- matching
- short answer completion

Multiple-Choice Items

Description

The multiple-choice test item consists of a problem or stem, a correct response, and one or more incorrect responses or distractors. It is probably the most widely applicable and useful type of objective test item. If constructed properly, the multiple-choice test item can measure any level of learning outcome, from knowledge recall to problem-solving.

Guidelines

To create multiple-choice items:

1. The correct and incorrect responses should be made grammatically consistent with the stem.
2. All responses should be homogeneous in terms of content, style, and length.
3. Plausible distractors should be developed to prevent unintentional cueing.
4. The responses should be arranged chronologically, alphabetically, or by some other logical system which avoids cueing.
5. The directions should state clearly if there is only one response, or if multiple responses are allowed.
6. Avoid cues such as the repetition of key words in the stem and correct response, or the suggestion of single or plural responses by the wording of the stem.

7. Cite the source in the stem for any item in which expert opinions differ.

8. Response sets should be restricted to four or five items.

9. The use of negative and double-negative statements should be avoided whenever possible.

10. Overlapping responses should be avoided to reduce ambiguity.

True/False Items

Description

True/false items permit fast response by virtue of the limited number of choices for learner selection. In spite of their susceptibility to guesswork, true/false tests may be very reliable because of the greater amount of content which can be sampled in the same amount of time it takes to complete other kinds of tests. The true/false item is particularly well adapted to critical content which is clearly true to the well-informed student.

Guidelines

To create true/false items:

1. Items should be developed in roughly the same proportion, randomly scattered throughout the test.

2. Broad generalities, which are open to interpretation or multiple concepts, should be avoided. Items should be completely true or completely false.

3. Vague qualifying terms such as "may," "generally," or "occasionally," should be avoided to reduce ambiguity.

4. Items should be of the same length to avoid unintentional cueing. For the same reason, terms such as "never," "always," and "all" should not be included in such items.

5. Negative and double-negative statements should be avoided to reduce ambiguity.

6. Tricky questions should be avoided in order to measure true knowledge or performance.

The Matching Exercise

Description

For purposes of classification and association of specific data, the matching exercise may be an appropriate testing strategy. It consists of a set of premises on the left side to be matched with responses on the right. Each premise and its matching response constitute a separate test item.

Guidelines

To create a matching exercise:

1. The content and style of both the premises and the responses should be homogeneous.
2. The set of premises should be kept relatively short to reduce fatigue and error.
3. More than one plausible response should be written for each premise. The total number of responses should exceed the total number of premises to eliminate selection by process of elimination.
4. Responses should seem plausible with more than one premise.
5. Responses should be scrambled to prevent cueing on the basis of arrangement.
6. Instructions should specify if more than one response matches with any given premise, or if a response may be use more than once.

Short-answer completion items

Description

If the critical performance must be assessed realistically, without the cueing normally provided in multiple-choice responses, the short-answer completion item may be necessary.

Guidelines

To create short-answer completion items:

1. Adequate space should be allowed for a complete learner response. Blanks or spaces should be uniform in length in order to prevent unintentional cueing.

2. Items should be as tightly written as possible to avoid ambiguity. If a numerical answer is required, for example, the units required should be indicated.

3. Items should be written as questions rather than statements to be completed. This avoids misinterpretation based on grammatical style.

4. Limit the required response to one blank, if possible, and place it at the end of the statement (for incomplete sentence formats).

Quality Control for Test Development

Guidelines

Ask yourself the following questions to check the quality of the test items you generate.

1. Are the items as a whole realistic and practical?

2. Do the test items deal with important and useful aspects of the subject?

3. Is each item (for non-performance tests) independent of every other item in the test?

4 Is the central problem for each item stated clearly, completely, and accurately? Is it specific enough to avoid misinterpretation or ambiguity?

5. Do the items contain only material relevant to their solution?

6. If multiple-choice, true/false, or matching items are used, are the distractors important, plausible answers rather than obvious distractors?

7. Do the items avoid cueing through irrelevant details or extraneous clues?

8. If multiple-choice items are used, do the alternatives deal with similar ideas or data expressed in similar form?

9. Are the test items tricky or trivial?

10. Are the items lifted verbatim from a textbook? Is rote memory the primary objective?

11. Is the reading difficulty of each item low enough to be easily understood by the learner? Is it phrased in the working language of the subject?

Alternatives to Traditional Assessment Strategies

Key Issues

When mastery of a particular skill or knowledge is critical, traditional paper and pencil tests are usually inadequate to determine whether the learner has in fact mastered the competency. Performance testing and other non-traditional methods of assessment are always preferred in such cases.

The nature of the desired skills may also lead the educator to consider alternatives to the traditional performance, essay, and objective examinations. This is particularly true of affective performance objectives, which do not lend themselves well to these assessment approaches. Although the following methods are somewhat imprecise, they may represent the only valid techniques for evaluating achievement of such objectives.

- Group discussions
- Formal and informal interviews
- Self-evaluation measures
- Peer reviews
- Role-playing
- Documents of attendance (when optional or required)
- Evaluation of learner response to program or instructor
- Review of academic journal
- Observations of classroom behaviors
- Observations of behavior in the professional environment

With these methods, performance measurement is usually based on a set of loosely defined criteria which may include frequency, intensity, quality, or duration of the desired behavior.

Application

Now apply what you've learned about assessments to an objective from your own experience.

1. Select one general learning objective from a course with which you are familiar (you may wish to draw on the work you completed in Module 3). Write the GLO and all related enabling objectives in the space below.

2. Now, using the guidelines presented, select an appropriate assessment strategy for each EO. (You may be able to assess achievement on more than one EO through the same testing strategy).

3. Next, determine the level of expected performance for each objective and indicate how many items you would devise for that objective.

4. Construct a sample of each type of item to be used. Use the quality control checklist to refine your items.

Evaluating Assessment Results

Key Issues

The evaluation of assessment results is based on the proficiency levels established when the objectives are first formulated. There are at least four ways to determine these proficiency levels

- Subjective judgment
- Expert consensus
- Current status of proficiency in practice
- Tradition

These sources dictate the level of performance which constitutes mastery of the desired knowledge or skill. This level may be absolute, with no margin for error, or variable, which establishes a range of acceptable performance.

Absolute mastery is an all or nothing proposition -- the learner must meet or exceed the standard. This is typically expressed in terms of 100% proficiency levels, and evaluated in pass/fail terms. *Mastery learning* allows the learners to continue studying for a particular competency until they achieve absolute mastery.

If the skill or knowledge does not require absolute mastery, criteria must be developed to evaluate variable performance. In *criterion-referenced evaluation* learner performance is measured against this established criteria. Evaluation on the basis of quantity of work accomplished is inappropriate, unless the primary behavior is limited to speed of production. Evaluation on the basis of quality of performance is more appropriate, but is often highly subjective. This subjectivity factor decreases as the evaluation criteria becomes more specific.

In the academic setting, learner performance is usually judged according to the relative performance of other learners. This approach, familiarly known as *norm-referenced evaluation* is the basis for our traditional grading system. Norm-referenced evaluation is contrasted with criterion referenced evaluation in Table 4-1.

TABLE 4-1: NORM-REFERENCED VS. CRITERION-REFERENCED METHODS OF EVALUATION

	NORM-REF.	CRITERION-REF.
Objectives defined?	Yes	Yes
Items written to sample content and behavior domains?	Yes	Yes
Difficulty level of items?	Items usually selected to yield maximum discrimination, that is, maximum spread of scores; difficulty indexes of multiple-choice items are usually around .50-.60.	Extremely easy items; average difficulty may be around .80 -.90. Extremely negatively-skewed; scores pile up at high end.
Variability and shape of distribution?	Test scores are usually symmetric and belly-shaped.	Test scores are negatively-skewed; scores aggregate at high end.
Standard of Assessment?	Assignment of grades; relative standard, i.e., relative to other students. Students are expected to miss some items.	Pass-Fail; or % of content known in the field. Students expected to get most items correct.
Security Issues?	Very important, in sampling-type, competitive N-R test.	Usually unimportant; tests are available for students' scrutiny.

	NORM-REF.	CRITERION-REF.
Extent of Sampling Knowledge?	Only samples course objectives; assumes that student knows more than shows on test.	Assesses or samples all essential behaviors.
Revision of Items?	If item is missed by many students, the item is revised.	If item is missed, and it is an important item, course is revised.
Decisions Involved?	Facilitates decisions about people; competition is selection.	Facilitates decisions about individual proficiency in terms of absolute standards; no concern for numbers, as in selection.
Item Construction?	In order to get variance, easy and hard items are thrown out; baiting with wrong options is increased. Discriminates between more or less knowledgeable learners.	As long as item represents behaviors delimited by criterion, does not matter whether the item is easy or difficult.
Reliability Levels	As high as possible.	Not as important
Validity	Content validity is essential; other types usually unimportant.	Content validity is essential; other types usually unimportant
Reporting of Scores	Percentile ranks and standard scores.	Group-relative indices are not appropriate. Can report that individual mastered item or certain % of content.

Article

The following article discusses some alternatives to the norm-referenced grading system. Read the article, which is reprinted at the end of the module. Then return here to answer the following questions.

Malehorn, H. (1984, February). Ten better measures than giving grades. *Clearing House.*

Questions

What has been your experience in using grades with adult learners? Have they had a negative or positive influence on adult learning?

Questions

Have you ever used any of the alternative measures discussed by Malehorn? If so, what were your experiences with such measures? What are the difficulties in implementing such measures?

Question

Besides measuring learning achievement, what else can evaluation results be used for?

Key Issues

The evaluation process is useful only when the results can be reviewed, analyzed and integrated into subsequent instructional planning. For the learner, the outcome of evaluation should be more than a mark entered into a grade book; it should give insight into:

- individual versus group achievements
- new experiences for which the learner is now prepared
- ways that acquired learning can be used in these new experiences
- skills and knowledge that need to be strengthened, or attitudes that need to be changed
- resources, techniques and activities that can help the learner rectify these needs
- changes that need to be made in future instructional plans to better help learners meet their objectives

It is important to recognize that there are several possible reasons for poor evaluation results.

- The learner's non-readiness for evaluation
- Misassessment of learning needs
- Deficits in the instructional plan
- Personal problems that interfere with learning
- Instructor performance and attitude

Application

Refer back to the assessment items you created earlier in this module. Now determine an appropriate evaluation method. Is absolute mastery required? If not, what is an acceptable proficiency level for minimum completion? How is credit for successful completion to be allocated?

Resources

For additional information on writing specific kinds of assessments and analyzing test items, see the following publications from the Faculty and Instructional Development Office, San Jose State University.

Constructing and scoring essay questions. Text and Workbook. Long Beach, CA: Office of the Chancellor (1981).

Constructing matching test items. Text and Workbook. Long Beach, CA: Office of the Chancellor (1981).

Constructing multiple choice test items. Text and Workbook. Long Beach, CA: Office of the Chancellor (1981)

Constructing true/false test items. Text and Workbook. Long Beach, CA: Office of the Chancellor (1981).

Developing opinion, interest and attitude questionnaires. Text and Workbook. Long Beach, CA: Office of the Chancellor (1981).

Item analysis. Text and Workbook. Long Beach, CA: Office of the Chancellor (1981).

Performance testing. Text and Workbook. Long Beach, CA: Office of the Chancellor. (1981)

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Making Decisions about Pretesting

It's Not a Simple Matter

Stephen Yelon

I have often been asked: What are the essential components of a proper instructional evaluation plan? I used to respond that a pretest is one of the most important elements of evaluation and that it should be included in an evaluation plan. The reasons were clear to me: instructional theories call for matching instruction to the level of the students' knowledge and abilities (Gagne, 1985; Gropper, 1983; Reigeluth & Stein, 1983). Therefore, one major task of instructional development is to find the students' prerequisites, and pretesting is the most obvious and simple way to do that.

However, my students and clients would not leave it at that. Sometimes instructors would not follow my advice to pretest. At other times, students and clients would ask difficult questions. Why don't most teachers pretest? Under what conditions should you pretest? When do you pretest for what you suspect are entry behaviors, and when do you test beyond that for enabling and even terminal objectives? How formally and how extensively should you pretest? How do you handle all the possible combinations of results you might get from administering a pretest? In thinking about these questions, I have become aware that pretesting involves complex decision making; it is not a simple matter.

In recent years, others in the field of instructional design have turned their attention to questions about pretesting and the complex problem of handling prerequisites. When considering the future of instructional design, Gagne (1970) discussed the need for a technology of handling prerequisites: "Instructional provisions for retrieval of prior knowledge as a condition for new learning range from simple reminders ('Remember that corn is a starchy food') to pretests that require and confirm recall. . . . Reminders of previous relevant learning tend to be included casually and incidentally, rather than deliberately. Here, then, is an area of potential importance for technical research and development."

Hartley and Davies (1976) also studied the effects of pretesting on learning and showed that pretesting could have a positive effect on student performance, depending on circumstances. They concluded that a pretest would facilitate learning, for example, when units of instruction were relatively short, when students were relatively bright, when items were difficult and when students were told the items they missed.

More recently, Bloom (1984) discussed some promising approaches to the use of pretests and strategies for responding to individual differences found as a result of pretests. Bloom mentioned a study by Leyton (1983). During the first week in an *advanced* course in a sequence, students were pretested and then aided in learning the prerequisites they lacked. As a consequence, these students performed much better on a first quiz than a control group and, with additional corrective procedures common to mastery learning, the average student in this group performed better on a final exam than 95% of a control group.

Indeed, there are many important decisions to be made regarding pretesting. To do so involves considering complex combinations of factors. To illustrate the complexity of decision-making about pretesting, consider these four major decisions.

1. Should I pretest?
2. On what should I pretest?
3. How should I pretest?
4. How should I adjust to the results?

Decision 1—Should I pretest?

The decision to pretest begins with knowing what is to be taught. Use a task analysis and some knowledge of what typical students can and can't do as they pass through the learning system in making a preliminary decision. Consider the content necessary for a particular task: the concepts, facts, principles, and skills. Among these prerequisites are the skills and ideas that students are likely to have when they begin the instruction (entry behaviors), as well as those that will have to be taught during the unit of instruction (enabling objectives). Actual student entry behaviors must be confirmed by observation. But informal estimates of student entry behaviors seem necessary to make further instructional design decision. Your estimates of likely entry behaviors are also influenced by your judgment about what are *desirable* skills and knowledge for students to possess when beginning the course of instruction, considering what has to be learned and the time and resources allotted for instruction.

For example, an instructor may wish to have his students learn to run an efficient discussion in a business meeting. Twelve hours are allotted for instruction and the instructor knows that facts, such as the advantages and disadvantages of consensus decision making and majority rule, principles, such as the principle of positive reinforcement, concepts, such as "structure," and skills, such as extracting the kernel of a person's comments, stating questions, relating ideas, and summarizing, are *desirable* prerequisites. However, taking into account what typical beginning students have known, an instructor might judge that the *likely* entry behaviors are the concept of structure, the ability to extract the kernel of a comment, the ability to relate similar ideas, and the ability to summarize.

The decision to pretest depends upon three factors: the evidence available on the students' likely entry behavior, the resources available to produce,

Table 1. When to Pretest—Make Decision on Preponderance of Criteria

	Need for evidence	Need for resources		Influence of entry behaviors			
	Is evidence available on entry behavior?	Are resources available to do a pretest?	Is time available to remedy deficiencies?	Are entry behaviors critical to enabling objectives?	Are entry behaviors critical to other units?	Is objective related important?	Is pretest needed for student satisfaction & expectation?
Do pretest	No	Yes	Yes	Yes	Yes	Yes	Yes
Don't pretest	Yes	No	No	No	No	No	No

administer and follow up a pretest, and the consequences of knowing precisely the students' entry behaviors. Let's consider each factor and how it relates to the decision to pretest. (See Table 1.) If you have sufficient evidence about the entry behavior of students, there is no need to pretest. In the absence of information on entry behaviors, some pretesting is necessary. For example, the instructor of the business meeting training program may know that participants are those who recently completed a course on how to praise and reprimand staff members. Thus, the instructor may have some evidence that participants know the principle of positive reinforcement, know the concept of structure, can relate ideas, summarize, and extract kernels from a person's comments. No pretest on those items would be necessary. However, if the instructor didn't know who was coming, he or she would be more inclined to pretest.

You must also ask if resources are available for pretesting. For example, given the number of students and the number and type of likely entry behaviors, is there time to plan, to produce and to give a pretest? Is there money to produce the materials needed for a pretest? Is there time and help for scoring a pretest? Can a found deficiency be remedied in the time allotted for instruction? Can students who do very well be moved ahead in the system? The fewer the resources, the more difficult it is to justify a pretest. The fewer the resources, the more likely it is that an instructor will produce frustrating circumstances by administering a pretest, finding deficiencies, and being unable to do anything about them for lack of time and money.

Suppose our business meeting instructor had no budgetary limits and no constraints about expanding course time to accommodate remediation. Then, even if a large number of participants had to make up a number of skills, such as to listen carefully and extract main ideas from a spoken message, the instructor would be inclined to pretest. However, if there were many participants, a limited budget, and a fixed amount of time, the instructor might be inclined to do his or her best without a pretest.

The decision to pretest depends heavily on the consequences of knowing the students' entry behaviors. You need to ask: Are the entry behaviors essential to the mastery of enabling objectives? Are they essential to the final performance? This implies that the purpose of the training session is to produce improved performance. If there is no intent to create a change, then consider the session as an entertainment and don't pretest. This also implies that the final performance is not easily attainable and that prerequisites are not very common. If they were, why pretest? Are these skills and ideas also needed for other units of instruction to come? Is the final performance of this unit very important? Is having a pretest necessary to let students know how well they are prepared, as well as to acquaint them with what the course is about? To the extent that entry behavior information is needed and the objective is important, a pretest ought to be considered.

For example, the business meeting instructor may note that skill entry behavior, such as extracting an idea from a person's comments, is essential to being able to post the ideas (an enabling objective). He may also realize that the enabling skill of posting, in turn, is essential to the final performance of producing consensus in a relatively short time. Because of his knowledge of the total training program, the instructor may also know that extracting ideas will be of use later in other courses, such as creative problem solving. Furthermore, the instructor may be aware that conducting efficient meetings is very important to improve morale and productivity. Finally, the instructor may want to use a pretest to activate skills that the participants already have. This may prevent surprise and discomfort when the participants are told that they will have to perform by listening to people and by responding in the course. On the basis of these thoughts, the instructor may be inclined to pretest. However, if the entry skills were supportive but not essential to the results, or the results were not crucially important, the instructor might decide not to pretest.

If you reject pretesting because there is evidence about the students' entry behaviors, you should review with the whole group the most important entry behaviors during the introduction to the first session. If you reject pretesting due to a lack of resources, you should reconsider and secure resources if the objective is important enough. If you reject pretesting because the associated objective is unimportant, then consider deleting that segment of instruction in favor of a more important goal. If you lack resources but still need evidence about entry behaviors which contribute to a very important objective, you may still decide to pretest. You will have to find the money and help needed or find the time to pretest by teaching fewer objectives, for example.

Decision 2—On what should I pretest?

Suppose you decide to pretest. Now you need to decide about the content of the pretest: Should I pretest on entry behaviors? Should I test on some or all of the entry behaviors? Should I test beyond entry behaviors to enabling or terminal objectives? The answers to these questions depend on the amount of evidence available about student abilities, the resources available, the relative importance of some entry behaviors compared to others, and the proposed uses of the pretest results. (See Tables 2 and 3.)

You should reduce the number and kind of entry behaviors pretested when there is evidence from other units of instruction for the acquisition of *some* entry behaviors, when the test will be very costly in time, money, or equipment, and when some entry behaviors are more likely to have a stronger influence on the final performance than others. Under those conditions, you would pretest on the most important entry behaviors for which there was no reliable evidence. Otherwise, when there is no evidence of student skill or knowledge, when the test is inexpensive, and when the entry behaviors are all equally important, you should pretest the complete set of entry behaviors.

If the instructor of the business meeting course knew from a previous course that students knew the principle of positive reinforcement, he would not pretest on that. However, if checking some of the interpersonal skill entry behaviors required individual testing and would involve considerable time and staff, the instructor might be less inclined to pretest on those. If the instructor believed that extracting key ideas was more important for the final performance than summarizing, and both summarizing and extracting ideas took considerable time to check, he might spend the time testing the more important skill.

You should go beyond entry behaviors and include enabling and terminal objectives in your pretesting when you have the tools, i.e., when there is a diagnostic test fitted to an available continuum and when the purposes of the pretest require information beyond entry behaviors. Therefore, you need information about the whole range of participants' skills when you want to know exactly where in the continuum to start teaching, when you want to compare scores from pretest to posttest, and when you intend to adjust instruction to individual differences.

If the instructor of the business meeting course had a continuum of skills leading to conducting a well-developed measuring instrument, including an observation checklist, he or she would be more inclined to pretest. If the instructor wanted to know precisely which skills to start teaching the group, so as not to bore some able students and not to go beyond other students, he or she would be more inclined to test on enabling skills to pinpoint the best starting place. If the instructor wanted to demonstrate to management that participants had indeed gained from the business meeting course, he might want to pretest beyond entry behaviors to show that the discussion skills taught were not in the students' repertoire before the course. If it were possible to exempt someone skilled in leading meetings from the course, the instructor might have a good reason to test enabling and terminal objectives.

Decision 3—How to pretest

When considering the strategy for pretesting, take into account four factors: the number of test items, the timing of pretesting, possible danger from faulty performance, and the threatening nature of the test. The consideration of each factor will have an effect on a part of your pretest strategy.

If there are many pretest items beyond entry behaviors to be administered, you can test from the terminal objective down by checking *each* prerequisite subskill and idea, or you can test by skipping to find the approximate area of student competence and then zeroing in on particular skills. For you to be able to test from terminal behavior down, it should be likely that the students can do the final performance to some degree but not with the quality or precision finally needed. Using this strategy, you observe which skills or ideas are missing and proceed to teach those. Skipping down the hierarchy is of use when students say that they cannot do the terminal performance or when students show inability to perform. The instructor should quickly move to the closest enabling objective.

For example, the business meeting instructor might suspect that an experienced manager could begin a meeting and, therefore, might ask him to introduce and state the question and start the discussion. If the student could not formulate or present the question properly, the instructor might stop there and skip down to asking what makes a good discussion question.

When there are relatively few test items of varied levels, you can proceed systematically from entry behaviors to enabling and terminal objectives. For example, if the hierarchy of skills contained only recognizing a good question, formulating one, and presenting one, the instructor could start with testing for recognition and work up.

When there are many testable items but all are entry behaviors, you can organize the items into subtests related to the units of instruction to come. A

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Table 2. When To Reduce the Number of Entry Behaviors To Be Tested

Reduce if any "Yes" answers

	Evidence for some entry behaviors from past units?	Test costly in time, money or equipment?	Some entry behaviors more important than others?
Test as is now	No	No	No
Reduce entry behaviors	Yes	Yes	Yes

Table 3. When To Test in Enabling and Terminal Objectives

If any "No" answers, then test only entry behaviors

	Resources		Purposes		
	Continuum available?	Diagnostic test available?	Need to know exactly where to start?	Have to compare scores for gain?	Desirable to branch?
Test only entry behaviors	No	No	No	No	No
Test enabling objectives & terminal objectives	Yes	Yes	Yes	Yes	Yes

subset can then be administered before each unit. However, if you need to pretest on all items at the start of the course, you will have to schedule time for pretesting and planning at the beginning of the course. If the business meeting course were divided into segments, such as introducing the discussion, soliciting responses, summarizing, and reaching consensus, short pretests could precede each segment.

If you are checking a skill at the start and using a terminal objective first approach, consider the possibility of harmful consequences. You should ask yourself: Could faulty performance result in bodily harm, equipment damage, fear, discouragement, or serious embarrassment? If any possibility of danger exists, begin testing by asking students if they can do the task. If they say that they can, ask them to describe how they would do the task, then ask them to act out the task and, finally, to perform the task in simulated, safe conditions.

If the students are likely to consider a pretest a threatening or fearful experience, you can use informal approaches to testing. You could provide self-checking tests with sources to explain items missed. You could post problems or concerns mentioned by participants. For example, participants could be asked what problems they had encountered soliciting responses for a discussion. You could ask objective questions informally as a presentation progresses: you could orally present true-false questions to the group on the advantages and disadvantages of decision by consensus before you explained each one. For objective questions, you could request a show of hands to answer a question or a brief oral response. But if a pretest is likely to be a positive or neutral experience, you can give the pretest formally before the first class, during the first class, during the first weeks of the course, or as "homework" during the first week of the course.

Decision 4—How to adjust to results

After items are created, administered as planned, and scored, you will need a strategy to respond to the results. Some

Table 4. How To Choose an Approach To Adjust to Varying Scores in Pretest

Decision Aid — Choose approach closest to situation variables to consider.

Adjustment Strategies	Range of scores	Commitment to teach all to a level	Resources available	Number of students
1 Give individual care Self-contained modules Seatwork Homework Mastery model Tutorial	Very wide range from low to high scores	Great	Many	Relatively few
2 Peer tutors	Split evenly between those who know & those who don't	Great	Peers Materials	Moderate
3 Group work	Clustered—some low, some moderate, some high	Moderate	Aides Level work	Moderate
4 Whole class review Teacher review Student review Advance vocabulary Pre-session Read, self-check	Few key behaviors lacking from a student	Moderate	Limited	Large numbers
5 Counsel to other class	Very low or very high	Moderate	Limited	Large numbers

of the possible strategies include individual care via self-contained modules (Davis et al., 1976; Alexander & Davis, 1977), individual class exercises (Anderson, 1982), homework, a mastery approach (Bloom, 1984), or tutorial (Cohen et al., 1982). Other strategies are peer tutors, group work, whole class review (Brophy and Good, 1984)—including teacher review, student review, advance work on vocabulary, pre-sessions, homework, and self-checking by students. Another approach is counseling students to go to other classes. (See Table 4.) The choice of strategies depends upon the range of scores, the commitment to help all students to reach a certain level of competence, the resources available, and the number of students.

If the range of scores is wide, from students barely able to perform entry behaviors to students able to perform the terminal objectives, if the commitment to teach all students is high, if there are many resources and relatively few students, then individualized care is the strategy of choice. If students' scores are clustered and split relatively evenly between those who are skilled and those not, if commitment to universal competence is high, if there are tutorial materials and trained tutors available and not many students, peer tutorial should be considered. If students' scores are clustered, if there is a moderate commitment to all students achieving at a certain level, if materials at various levels are available, as well as aides to work with groups and not many students, group work might be the appropriate strategy. In contrast, if only a few important skills or ideas are needed by most students, if there is a moderate commitment to all students achieving at a certain level, if resources are limited and there are large numbers of students, then whole class review is recommended. If scores of a few students are very low or very high, if the emphasis on all achieving course objectives is high, if resources are limited and if there are many students, consider advising the students at the extremes to enroll in other classes in which instruction can be presented at the appropriate level and with the attention needed.

Conclusion

It's no wonder that some instructors don't pretest or don't think about pretesting. The decisions to make regarding pretesting are numerous; the factors to consider are many, the process is complex. Instructional developers need to be a bit more cautious when offering quick advice about pretesting. When asked if a pretest should be used, an appropriate answer would be: it depends.

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Ten Measures Better than Giving Grades

HAL MALEHORN

Grades have been a part of schooling for generations. They have become so pervasive and so predictable that teachers, pupils, and patrons alike regard them as essential and inevitable. However, some professionals, sensitive to the distress and misinformation that are so often associated with grades, argue for alternatives. At least ten better methods of assessment are available for use either separately or in combinations. All of them have been amply described in the professional literature, and all of them have aspects that particularly recommend them.

> **". . . individual initiative and group leadership are surely no less essential to personal fulfillment and to national survival than the ability to recall dates from history."**

1. *Multiple Marks:* Just one grade for each subject of study represents in a single statistic an unfortunate lumping together of many educational expectations and assessment criteria. In view of the many variables that are involved in learning, there are compelling reasons for teachers to identify and then to give equal credit to all types of achievement. There is no justification, for example, to claim that the ability to memorize facts in a given subject is any more vital than the appreciation and practice of that same subject. Similarly, individual initiative and group leadership are surely no less essential to personal fulfillment and to national survival than the ability to recall dates from history.

Simply by developing multi-faceted grading and reporting procedures, teachers could reflect more completely the variety of their interactions with pupils and the importance of different educational objectives. This move would recognize and reward the diverse goals school personnel claim to pursue.

2. *Contracted Learning:* More and more teachers are finding satisfaction in arranging agreements with their pupils for all or part of the instructional year. For one thing, contracts emphasize an element of trust. Students newly responsible for their own learning help select the sites, the materials, the media, the times, and the topics of study. And, they participate fully in the evaluation along the way.

In addition, since contracts stipulate specific outcomes, procedures, indicators of quality, and the grades associated with specific attainments, students no longer wonder from day to day if they are performing poorly or well. And because contracts build in certain guarantees before the learning even begins, the teachers and pupils no longer engage in their traditional cat-and-mouse games.

3. *Mastery Learning:* Insightful instructors are realizing today that the learning process itself, not the grade, is the primary purpose of schooling. Benjamin Bloom pointed out long ago that, given adequate time, appropriate support, and ample motivation, perhaps as many as 90 percent of the students of at least normal intelligence could achieve at the levels customarily associated with "A" grades.

Mastery learning is also attractive in that it often entails the use of criterion-referenced materials. Students know exactly what is expected of them, and they continue their efforts without penalty until these expectations are fulfilled. Freed from the fear of failure, students are limited only by their interests and their commitment to study.

4. *Credit/No Credit:* A few institutions have recently experimented with variations of a pass fail arrange-

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ment. The rationale for this approach is that it allows students to explore safely unfamiliar areas of inquiry. Credit/no credit is also useful because it accommodates, without stigma, all unfinished course work. However, where credit/no credit opportunities have been tried, professionals have found that unless the concept is universally applied at the site, students tend to slack off in their credit/no credit courses because they are understandably much more concerned about succeeding in classes where grades are given.

5. *Checklist:* This method identifies specific objectives to be marked off as they are attained. Student progress is reported only in terms of the numbers and kinds of accomplishments satisfactorily completed during a period of study. Comparisons among pupils are generally not made.

A further advantage of the checklist is that teachers who personalize their instruction are able to list skills that more appropriately accommodate individuals' interests, needs, abilities, motivations, and modalities. Comparisons between and among pupils then become impossible, simply because members of a group are so often working on quite different tasks.

6. *Anecdotal Records:* While written descriptions of pupil progress have been used by teachers for decades, they have too often been inaccurate, incomplete, and prejudicial. In addition, narrative comments have seldom been legitimized as official school records.

In light of present-day computer capabilities, there is no excuse not to include as official reports printouts describing in detail scholarly accomplishments. These anecdotes would certainly supply much more information about a learner's potential and progress than grades do.

7. *Pupil Profile:* This technique can either supplement or replace the system of multiple marks mentioned earlier. However, it is more useful in instructional areas where outcomes are readily quantified. The teacher indicates the most significant objectives: and then, as students proceed through their tasks, line-graph profiles are drawn on the record sheet. At the conclusion of each successive evaluation period, a new profile is superimposed on the preceding report, thereby indicating visually the growth that occurred during that time in the several areas of student involvement.

8. *Dossier:* If professionals and clients really do want to know how well students perform, what means could be more informative than examining the pupils' actual work? One would not have to guess at spelling competencies, if, for example, original compositions were at hand. Art projects, tests, essays, stories, and many other accumulated bits of evidence could provide insights into the class members' actual thought processes—something that no grade could ever do.

9. *Peer Evaluation:* If the contesting for grades were somehow magically eliminated, classmates could work together for their common intellectual welfare. Learning would then become their driving force, and the wisdom of the entire group would be marshalled in helping each other. This cooperative atmosphere would represent a nirvana for pupils who so often are otherwise forced into collusion, cheating, flattery, manipulation, theft, and other unethical behaviors that spring from trying to outdo one's peers.

10. *Self-Evaluation:* Although self-assessment is listed last, it represents an optimal opportunity to estimate progress. Self-assessment accompanies the natural learning which occurs outside the school. For instance, in play groups, clubs, and co-curricular activities, learnings come about without the help of teachers or the necessity of external evaluation. Long before youngsters enter a classroom, they master many essential human skills simply by using their powers to observe and to imitate.

In view of the number, variety, and reasonableness of these and other alternatives, traditional grading can no longer be defended. Marks are misleading and incomplete at best; and at worst they are inhibiting and traumatizing. If the goal of educational establishments is truly to foster all kinds of learning, school personnel need to examine their assessment methods. Perhaps more than any other element of schooling, grades interfere with pupils' efforts to learn. If teachers genuinely want their students to grow, they should carefully consider these ten timely techniques.

Module 5

Designing Activities that Facilitate Learning

–Learning Activities: Linking Objectives and Outcomes
–A Menu of Learning Options
–How to Derive Learning Activities
–Learning Activities and Instructional Theory
–Designing Instruction for Adult Learners
–Logistical Considerations in Selecting Learning Activities
–References
–Reprints

Designing Activities that Facilitate Learning

Preview

It has been suggested that the single most important consideration in designing effective instruction is the provision of tactics, tools, and examples which relate new learning to prior experience. Finding creative ways to bridge this gap, which take into consideration program goals, logistical constraints and learner needs, is a major challenge facing the instructional planner.

Goals

In this module, you are invited to:

- Explore the role of learning activities in the instructional process
- Examine the sources of learning activities
- Select appropriate learning activities for different kinds of learners
- Evaluate various types of learning activities and instructional media in terms of their relative effectiveness

Learning Activities: Linking Objectives and Outcomes

Purpose

Learning activities represent those experiences that facilitate the achievement of performance objectives. While objectives describe *what* the student is to know or do, learning activities represent *how* the student is expected to achieve them.

Learning activities suggest the instructional strategies and methods, presentation modes, practice settings, and instructor/learner interactions which will be utilized in helping the learner accomplish the desired performance objectives. Because they are the foundation of the teaching-learning process, the design of such activities takes into account program goals, learner needs, situational/financial constraints, and relevant learning theory.

Questions

What approach do you currently use to determine the learning activities for a particular lesson? On what information are your decisions based?

A Menu of Learning Options

List

The range of activities that can be used to facilitate learning is nearly limitless. The following list, which distinguishes between classroom and out-of-class activities is only a sample of the options available.

TABLE 5-1: A SAMPLING OF LEARNING ACTIVITIES

CLASSROOM ACTIVITIES	OUT-OF-CLASS ACTIVITIES
Role playing	Field experience
Seminars	Self-evaluated role-playing
Lecture/discussion	Field interviews
Problem-solving activities	Group or individual projects
Decision-making activities	Writing papers
AV presentations	Research activities
Debates	Field trips
Structured observations	Take-home exams
Laboratory experiences	Programmed instruction
Demonstrations	Professional meetings
Small group discussion	Field experimentation
Games and simulations	Computer-assisted instruction
Case study	Tutoring

Questions

Which of these activities do you find most effective in helping students learn? With what kinds of performance objectives do they work best?

Key Issues Any of the activities listed in Table 5-1 may be appropriate, depending on the performance objectives desired and the constraints of the instructional setting. If we look at performance objectives alone, the following general associations can be made between selected activities and learning outcomes.

TABLE 5-2: RELATIONSHIP BETWEEN LEARNING ACTIVITIES AND DESIRED OUTCOMES

LEARNING OUTCOME	PRIMARY ACTIVITIES
To acquire prerequisite skills or knowledge	Independent study, tutoring
To appreciate the scope and importance of a content area	Lecture/discussion
To comprehend concepts, principles, or theories	Independent study, practical exercises, discussion
To expand skills or knowledge beyond minimum competency	Independent study, practical exercise
To apply rules, principles, or procedures	Demonstration, practical exercises. discussion
To improve problem-solving ability	Independent study, practical exercises, discussion
To acquire manual or manipulative skills	Demonstration, practical exercises
To improve human relations or communications skills	Case studies, role playing
To improve collaborative skills	Simulations, games
To improve leadership or management skills	Case studies, role playing

How to Derive Learning Activities

Procedure

Learning activities can be properly selected only after performance objectives have been established and instructional strategies have been defined. Just as enabling objectives result from a progressive analysis of learner needs and program requirements, so learning activities are derived from a progressive breakdown of instructional strategies and tactics. This analysis consist of four levels, and is influenced by a variety of factors as shown in Table 5-3 (Romiszowski,1981, p. 276-277). The key terms in Romiszowski's model are defined as follows:

- *Instructional strategies*: the general viewpoints and line of action that one adapts in order to choose the instructional methods
- *Instructional plans*: the specific combinations of methods that one decided to adopt in a given course of instruction
- *Instructional tactics*: the specific ways that one chooses to implement a particular method in a particular case
- *Instructional exercises*: the actual activities and events that occur when a particular tactic, or a set of tactics that make up a lesson are put into practice

Questions

What is your evaluation of Romiszowski's paradigm for deriving learning activities? Is it feasible to implement such a process in your practice setting? Why or why not?

TABLE 5-3: ANALYSIS OF INSTRUCTIONAL STRATEGIES

The Application of:	**In the Context of:**	**Determines:**
Theories and philosophies of instruction	Final objectives, target population, and the system as a whole	Instructional *strategies*
Instructional strategies	General performance objectives, entry skills, resources, and logistical constraints	Instructional *plans* or *methods*
Instructional plans	Content, enabling objectives, and skill and knowledge taxonomies	Instructional *tactics* for each step of each lesson
Instructional tactics	Practical experience	Specific *learning activities*

Reprinted, by permission, Romiszowski, A. J. (1981). *Designing instructional systems: Decision making in course planning and curriculum design*. New York: Nichols Publishing.

Learning Activities and Instructional Theory

Key Issues

In Romiszowski's model, the first level of analysis leading to the derivation of learning activities depends on considering relevant philosophies and theories of instruction. A number of instructional theories have been proposed which can offer educators guidelines in how to develop appropriate instruction. These theories offer perspectives on the way learners acquire information, on the most effective way to pace learning practice, and on ways to classify and teach content.

Article

The following article provides a survey of major instructional design theories and their relevance to the design of learning activities. Read the article, which is reprinted at the end of the module. Then return here to answer the questions that follow.

Salisbury, D. F., Richards, B. F., & Klein, J. D. (1985). Designing practice: A review of prescriptions and recommendations from instructional design theories. *Journal of Instructional Development.*

Questions

Which of the theories discussed in the article parallels your own orientation to teaching? What are the implications of this theory to the development of instruction?

Application

Select a specific performance objective from your own practice or experience. Design an instructional strategy for achieving the objective, using principles embodied in the theory you identified on the previous page.

Designing Instruction for Adult Learners

Key Issues

While the instructional planning process is essentially the same for any type of learner, adult learners have special needs that directly affect the design of learning activities. These needs are related to experience, motivation, physiological and psychological barriers, and memory. Based upon the varied research which has been conducted on the adult learner, educators should try to create activities which address the following (The National Center for Research in Vocational Education, 1986).

Encourage Participation

While the traditional role of the learner is to listen to the teacher and respond when called upon, the adult learner is expected to participate as a colleague. Since this may contradict preconceived notions of authoritarian teaching, the adult may need encouragement to become fully involved in this type of learning. Some strategies to promote adult participation include the following:

- Ask learners to explain what they want from the course or program
- Involve learners in establishing course content and management procedures
- Provide alternative learning options
- Draw on learner experiences as an instructional resource
- Monitor learner satisfaction

Facilitate Independence

Although adults may think of themselves as independent in most areas of their lives, many assume an attitude of dependence upon returning to school. The reasons for this are three-fold:

- Conditioned to years of structured teacher-directed education, adults may be more comfortable with traditional teacher-student roles
- Adults may lack self-esteem and confidence as learners, particularly if the learning involves retraining or a career shift
- Since it may have been some time since they have attended college, adult learners may feel insecure in a new and different educational setting

To help adults become more independent as learners, the following guidelines are recommended:

- Encourage adults to participate in the learning process
- Offer yourself as a role model
- Incorporate decision-making and problem-solving activities in your instruction

Address Individual Differences

Perhaps the most distinguishing characteristic of the adult learner is his or her uniqueness. Adults differ from one another in terms of needs, abilities, learning styles, motivations, socio-cultural background, and personality. In order to accommodate these differences, the following strategies can be implemented:

- Vary your instructional techniques and materials
- Relate instruction to learner experiences
- Provide alternative pacing options
- Accommodate special differences where possible

Build Confidence

The confidence and self-esteem of adults returning to school will be bolstered through many of the strategies already mentioned. However, the other strategies must be considered to achieve this goal:

- Provide positive reinforcement frequently
- Provide successful experiences by building on existing ability

Promote Group Cohesion

Peer networking and group cohesion are important not only in facilitating participation, but also in reducing attrition. Group cohesion can be encouraged through the following:

- Use ice-breaking techniques
- Assign learning activities based on group process

Article

To further explore the design of learning activities which combine systematic instructional design principles and adult learner characteristics, read the following article, which is reprinted at the end of the module. Then return to this page and complete the application exercise.

Bonner, J. (1982, Fall). Systematic lesson design for adult learners. *Journal of Instructional Development*.

Application

How would you modify the instructional strategy you developed earlier to accommodate the special needs of adult learners?

Resource

The following CIP publication provides additional background on the needs of adult learners and how to design instruction that specifically meets these needs in the academic setting:

Center for Innovative Programs. (1989) *The adult learner in higher education: A resource and planning guide*. Long Beach: Office of the Chancellor, California State University.

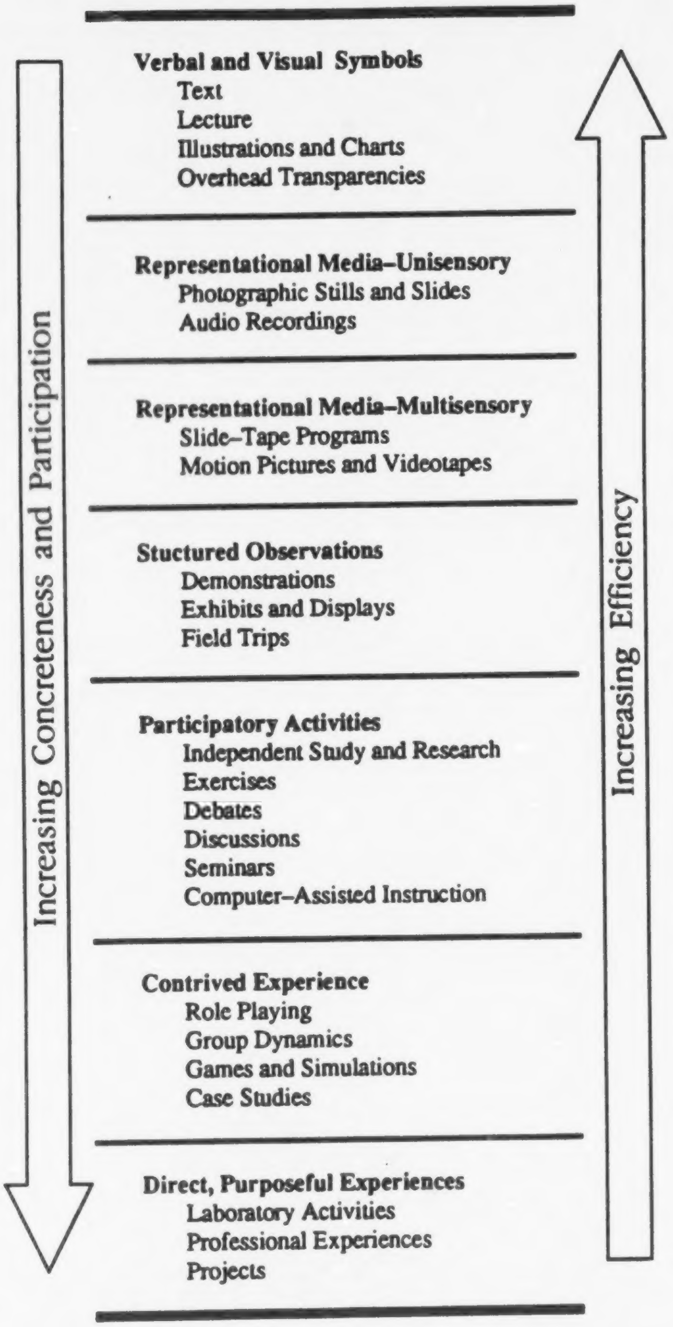
Logistical Considerations in Selecting Learning Activities

Key Issues

It is at the second level of design, when general instructional strategies must be translated into specific plans, that another set of factors must be taken into consideration. An important step in designing learning activities is to identify all constraints which would inhibit the implementation of instruction. Some of the key questions to ask include:

- Where will the learning take place?
- How much will it cost to implement instruction?
- How much time is available for completion of the activities?
- Will the instruction have to be administered to students collectively or individually?
- If hardware is required, is the necessary equipment available?
- Are production facilities and time available for production of the necessary software?

Once these questions have been answered and the logistical constraints established, appropriate learning activities can be developed. The figure on the following page shows the tradeoff between effectiveness (in terms if helping learners achieve objectives) and efficiency (in terms of reaching the most learners with the least effort) of the more familiar learning activities and presentation media.



Verbal and Visual Symbols
- Text
- Lecture
- Illustrations and Charts
- Overhead Transparencies

Representational Media–Unisensory
- Photographic Stills and Slides
- Audio Recordings

Representational Media–Multisensory
- Slide–Tape Programs
- Motion Pictures and Videotapes

Stuctured Observations
- Demonstrations
- Exhibits and Displays
- Field Trips

Participatory Activities
- Independent Study and Research
- Exercises
- Debates
- Discussions
- Seminars
- Computer–Assisted Instruction

Contrived Experience
- Role Playing
- Group Dynamics
- Games and Simulations
- Case Studies

Direct, Purposeful Experiences
- Laboratory Activities
- Professional Experiences
- Projects

FIGURE 5-2: RELATIVE EFFECTIVESS/EFFICIENCY OF VARIOUS LEARNING ACTIVITIES

Application

1. Select one general learning objective from a course with which you are familiar (refer to Module 3 if you wish). Write the GLO and all related enabling objectives in the space below.

2. Now, using the guidelines presented in this module, select/devise learning activities for each EO that are appropriate for the instructional orientation and logistical constraints you are accustomed to working with in your practice setting.

References

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Salisbury, D. F., Richards, B. F., & Klein, J. D. (1985). Designing practice: A review of prescriptions and recommendations from instructional design theories. *Journal of Instructional Development, 8* (4), 9-19.

Reprints

Salisbury, D. F., Richards, B. F., & Klein, J. D. (1985). Designing practice: A review of prescriptions and recommendations from instructional design theories. *Journal of Instructional Development, 8* (4), 9-19. Reprinted with permission.

Bonner, J. (1982, Fall). Systematic lesson design for adult learners. *Journal of Instructional Development, 6*(1), 34-42. Reprinted with permission.

Designing Practice: A Review of Prescriptions and Recommendations from Instructional Design Theories

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Abstract. Most instructional theories offer some unique and valuable suggestions related to the design of practice activities. However, no single theory or model is available which provides instructional designers with answers to many basic questions related to designing practice activities. The purpose of this paper is to summarize the strategies and suggestions offered by various prominent instructional theories and thereby provide a useful guide for designing the practice component of instruction.

Various instructional theories include recommendations for designing practice activities for different types of learning tasks. Each theory offers some unique and valuable suggestions related to the design of practice activities. However, no single theory or model is available which provides the answers to many of the basic questions instructional designers frequently encounter in designing the practice component of instruction such as: "How much practice is required for skills which will later serve as subskills to more complex skills?" "Should separate skills be practiced separately or should they be practiced together?" "Where should help be used during practice?" "When should practice items be selected at random?" In order to aid instructional designers in answering these questions, a more useful and complete guide is needed. The purpose of this paper is to summarize the somewhat piecemeal strategies and recommendations included in various prominent instructional theories and thereby provide a useful guide for designing the practice component of instruction.

It might be appropriate to state why such a focus on the practice component of instruction is needed. One reason comes from research in modern cognitive learning theory which suggests that in order to perform complex intellectual tasks such as reading, computing, or computer programming, many of the subskills involved have to be *automatized* so that attention can be devoted to the more intricate and complicated aspects of the total task (Anderson, 1980). Certain critical subskills must not only be mastered but must, through practice, be brought to a state of automaticity. Research in areas such as reading and mathematical problem solving suggests that one reason students have difficulty performing higher order cognitive skills is due to a lack of automatic performance of the underlying subskills (Lesgold, 1983; Lesgold & Resnick, 1982; Resnick & Ford, 1981).

Another reason to concentrate on practice stems from the increased use of computer-based training. Microcomputers allow designers to incorporate into practice strategies psychological techniques and procedures beyond what might otherwise be possible. However, designers still need some guidance in selecting the appropriate instructional techniques for various types of computer-based practice activities.

A third reason is the current use of authoring systems or templates for the design of CAI. Generally, the various authoring systems that have been developed offer only one strategy for practice while most instructional design theories prescribe different practice activities for different types of learning tasks. For this reason, several authors have recommended the development of more specialized templates for authoring. To quote Merrill (1981): "The use of templates would be more acceptable if a variety of templates were provided for the different types of learning" (p. 10). An integration of the various strategies and prescriptions provided by instructional design theories is needed in order to design authoring templates for specialized types of practice activities.

Some theorists have made the observation that there is already a great deal of scientific knowledge about learning and cognition and what is needed now is a synthesis of those areas of knowledge which are most likely to increase the quality of instructional products (Reigeluth, 1983; Reigeluth, 1985; Gerlach, 1984). Conceivably, this synthesis would result in prescriptive models or generalizable rules which would guide the behavior of instructional designers. This paper attempts to provide such a synthesis in the area of designing practice. It is also hoped that this work will stimulate the formulation of other syntheses.

Rationale for Selection of Theories

Theories which provide the most pertinent information for the design of practice have been selected for review. There are many good instructional models which are not included because they concern themselves primarily with course development or large-scale curriculum or program development and do not provide recommendations for the design of the practice component of individual lessons.

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The motivational design model of Keller (1983) was included because motivation is important in the design of practice and because it is relatively neglected in other instructional theories. While some of the theories regard motivation as an important element of instruction, none provide any concrete strategies for enhancing motivation.

Recommendations for the Design of Practice Activities Derived from Behaviorism

Behaviorism is concerned with those factors in learning that are external in nature. The behaviorist is interested in predicting and controlling behavior through reinforcement. In a behavioral approach, the learner is presented with a stimulus, and a response is made. The response is then reinforced. When a stimulus is presented repeatedly, and the appropriate response to it is made, the response is said to be under the control of that stimulus. Establishing stimulus control depends upon two conditions: active practice of the correct response; and, reinforcement of the response following its practice.

> What is needed are prescriptive models or generalizable rules which can guide the behavior of instructional designers.

Stimulus control is established through four levels of skill acquisition. These are: *discrimination* level (learning to discriminate one stimulus from another), *generalization* level (learning to respond to any stimulus belonging to the same class of stimuli), *association* level (learning to associate an appropriate response with a stimulus or class of stimuli), and *chaining* level (learning to combine S-R associations into a complete chain). Learning to perform an activity involves learning to discriminate stimuli, generalize, associate, and chain. The object of practice is to help the learner master all the S-R associations in an activity and to integrate them into a complete chain. Techniques such as *incrementing*, *shaping*, and *fading* are used to accomplish this.

One might view the behaviorist theory as a collection of general principles and concepts which govern the acquisition of a skill. George Gropper has done a great deal of work in integrating the general principles of behaviorism into concrete prescriptions for designing instruction (Gropper, 1973, 1974, 1975, 1983). Gropper identifies six "tools" which instructional designers can apply directly to specific instructional tasks. In essence, these tools are components of the learning environment which can be varied to increase or decrease the demands put on students at any stage in a practice progression. *Early practice* sessions are designed to place less demand on students, *intermediate practice* sessions increase demands on students in one or more ways, and *final practice* sessions require students to perform the skill in criterion mode. The six tools are:

1. The amount of cueing that is provided for a practice task,
2. The size of the unit of behavior that is practiced in a practice task,
3. The mode of stimulus and response that is required in a practice task,
4. The variety that is built into a practice task,
5. The type of content involved, and
6. The frequency with which a task is practiced.

The designer uses these tools to systematically vary the practice so that *early*, *intermediate*, and *final* practice differs in one or more of these six ways. For example, in early practice, cues are provided, in intermediate practice fewer cues are provided, and in final practice no cues are provided. Gropper's model shows how to vary practice sessions using the six tools in order to increase the demand placed upon students in the three stages of practice. Gropper provides prescriptions involving cue strength, behavior unit size, stimulus and response modes, practice example variety, content of practice, and frequency of practice.

Gropper also provides suggestions for organizing practice activities and matching practice activities to objectives. The following table summarizes his recommendations for five types of learning objectives.

Recommendations for the Design of Practice Derived From the Work of Gagne and Briggs

According to Gagne (1984, 1985), learning tasks can be classified into five categories: verbal information, intellectual skills, cognitive strategies, motor skills, and attitudes. The learning (and consequently the practice) within one category is different in important respects from the learning (and practice) in the other four categories.

Gagne and Briggs (1979) outline nine *events of instruction* which facilitate the five different types of learning. Because different conditions are required for different learning outcomes, the nature of the events of instruction also differs for each type of learning outcome. The Gagne and Briggs theory also includes some guidelines for selecting instructional media. The nine events prescribed by Gagne and Briggs are shown in Table 2.

According to this formulation, practice is defined as the portion of instruction which takes place after students have initially been presented the information needed to perform an objective (events 1-5) but before they have had an opportunity to master it. This definition of practice views practice as what student do after having been guided through the material and before being tested on it (event 8). If the students fail the test, they should then receive more practice (more of events 6 and 7). Enhancing retention and transfer is also accomplished in part through the practice component of instruction.

Some of the guidelines for selecting media coming from the theory are also applicable to the design of practice activities. Briggs defines instructional media as all methods used to present stimuli to students. In this sense, media include not only audiovisual materials, but also include the teacher and other activities. Briggs recommends that media be selected separately for each instructional event depending on what conditions are necessary to present that event. Based on this idea, media for the practice component of instruction would not necessarily be the same as the media

Table 1
Practice Treatments for Five Types of Learning

Type of Learning	Initial Practice	Intermediate Practice	Final Practice
Learning Facts	• Tell students the facts they are to learn. • Provide cues to highlight the facts when a number of facts are to be learned at one time (e.g., a table of basic multiplication facts highlighting pairs of numbers and their products). • Require practice of only a few facts at a time.	• Have students apply the facts as well as state them (e.g., using the basic multiplication facts). • Fade cues used in initial practice. • Increase number of facts practiced.	• Have students apply all facts when possible. No longer require students to state the facts. • Eliminate all cues. • Have students practice the total criterion behavior (e.g., all multiplication facts are practiced in a random order).
Defining Concepts	• Define concept and ask students to state it. • Use cues to differentiate between instances and non-instances. • Have students classify instances. • Use concrete objects in early practice when possible.	• Continue to give instances and non-instances but make them more difficult to differentiate. • Have students generate some instances. • Still ask students to state definition. • Gradually make instances more abstract.	• Require students to state definition, and classify or generate instances *without* cues. • Make practice abstract, verbal, or symbolic.
Giving Explanations	• Provide students with the explanation and require them to practice stating it. • Provide specialized cues (like flowcharts and demonstrations) to help students relate *multiple concepts*. • Give examples and non-examples of the explanation.	• Continue giving examples and non-examples but gradually make them more difficult. • Require students to produce their own explanations in their own words *in addition* to giving the model explanation. • Gradually fade cues.	• Have students state the explanation in their own terms without the use of cues. • Require students to *use* the concept being explained *instead of just* giving the explanation (e.g., using the principle of reinforcement, not just stating it).
Following Procedural Rules	• Provide students with the steps for following the procedure or give a demonstration of the procedure. • Require students to practice the steps in the procedure. • Break down long or difficult procedures into smaller units and practice the individual units (e.g., learning to drive may start with learning the rules of the road before getting behind the wheel.)	• Continue practice of the individual steps in the procedure. • Add additional steps to long or difficult procedural chains.	• Require students to practice the procedure in full with no breaks in the chain.
Solving Problems	• Give students the rules needed to solve the problem. • Require students to distinguish correct answers from incorrect ones. • Break up difficult or long problems into smaller units and practice the individual units (e.g., solving long division problems is practiced step by step.)	• Give students a problem with a wrong answer and ask them to correct it. (Practice moves from the recognition phase to the editing phase) • Require students to generate their own rules for solving a problem.	• Require students to solve the problem with no help. (Practice moves into the production phase). • Ask students to generate their own solutions when possible (e.g., answering long division has a fixed procedure, and unique solutions may not be found). Other problem solving can be unique.

Table 2
Instructional Events

1. Gaining attention
2. Informing the learner of the objective
3. Stimulating recall of prerequisite learning
4. Presenting the stimulus material
5. Providing learning guidance
6. Eliciting the performance
7. Providing feedback about performance correctness
9. Enhancing retention and transfer

Table 3
Practice Activities for Different Types of Learning

Learning Outcome/ SubCategory	Eliciting the Performance	Providing Feedback
Intellectual Skills		
Discriminations	Provide a variety of items which require students to show that they see two or more objects as different objects by responding to their names.	Indicate if response was correct or incorrect. For multiple discriminations also give correct response.
Concrete Concepts	Provide a variety of items which require students to point to two or more instances of the concept. The instances should differ as widely as possible in their non-elevant or-characteristics.	Refer to properties present or not present in instances.
Defined Concepts	Provide a variety of items which require students to identify the referents of the words which make up the definition and show their relationship to one another.	Refer to the parts of the demonstration which were incorrect and tell why they were incorrect.
Rule Using	Provide a variety of items which require application of the rule.	Refer back to rule and show how correctly or incorrectly applied.
Problem Solving	Provide a variety of problems for solutions.	Change stimulus situation in response to learner's action and/or state the rule being followed or violated at each resuonse.
Verbal Information		
Facts	Ask student to state each fact verbally.	Identify what is wrong or omitted from the statement of the fact.
Names/Labels	Ask student to provide the name/label for each object.	Identify what is wrong or omitted in the name/label.
Connected Discourse	Ask student to state the material verbatim.	Identify errors and state correct version.
Organized Knowledge	Ask student to state proposition in own words.	Identify what is wrong or omitted from the statement of the proposition.

used to present the other events of instruction. Also, the selection of media for the practice of a skill will depend upon the type of learning outcome involved.

Table 3 outlines the recommendations for eliciting responses and providing feedback for two kinds of learning: intellectual skills and verbal information. Note that the stimuli and the feedback differ for each subcategory in the two learning categories.

Component Display Theory and the Design of Practice

According to the Component Display Theory (Merrill, Richards, Schmidt, & Wood, 1977; Merrill & Tennyson, 1977; Merrill, 1983), instruction to teach cognitive subject matter consists of a series of presentations that convey information or ask questions. These presentations, or instructional building blocks, can be described using five partially independent taxonomies. These taxonomies and their categories are as follows.

1. *Type of content*: Facts, concepts, procedures, and principles (rules).

2. *Level of Performance*: remember (recall, recognize), use (classify, demonstrates), and find (discover, deduce, derive).

3. *Abstractness of Subject Matter*: generalities (definitions, list of steps) and instances (examples, specific cases).

4. *Presentation Mode*: expository (tell, illustrate) and inquisitory (question).

5. *Presentation Form*: primary presentations (generalities, examples, and practice), secondary presentations (elaborations, helps, mnemonics, feedback), process displays (advice about how to learn), and procedural displays (instructions about how to use delivery media).

This theory specifies the types of presentation (the mix of the 5 taxonomies) to include for effective instruction. Practice consists of inquisitory (4) primary presentation forms (5) that require students to demonstrate knowledge of generalities or instances (3) at any level of performance (2) and for any type of content (1).

The relationships among the 5 taxonomies can best be seen using three 2-way matrices. The first matrix (Figure 1) combines performance level and type of content. All practice activities in a subject area can be classified into one of the 10 cells of the matrix. Sample practice questions from a variety of subject areas are included in each cell as an illustration.

According to the component display theory, learning is most likely to occur when instruction properly uses primary and secondary presentation forms. Primary presentation forms deal with the essence of the objective to be learned. Secondary forms add to that essence such things as cues, background information, advice about learning, and feedback. Primary and secondary forms can be presented together (as an integrated display) or separately.

There are four types of primary presentation forms that can be made by crossing abstractness of subject matter with presentation mode. Figure 2 contains this abstractness-mode matrix with a sample primary presentation in each cell. Practice is represented by the inquisitory column.

There are eight types of secondary presentations. Use of each type depends upon the context, performance level, abstractness, and mode of the primary form with which it is associated. For example, a secondary presentation for an expository generality about a complex concept could be brief definitions of subconcepts. The most important secondary presentations for practice are feedback and alternate representation of questions. Component display theory prescribes the minimum set of primary and secondary presentations for each performance level and for each presentation mode. Figure 3 presents a brief summary of these prescriptions. Practice again is represented in the inquisitory column.

Component display theory provides numerous guidelines regarding the quality and quantity of practice. Seven guidelines are summarized below.

1. Make practice activities (inquisitory presentations) *consistent* with the type of content and performance level specified in the objective.

2. Require a *use* or *find* level of performance as much as possible.

FIND		Sort these rocks into piles Tell how somebody would sort them into the same piles later	Write a computer program that will index and retrieve recipes.	Set up a demonstration that will help show how water gets into a well
USE		Is this mountain a folded mountain?	Demonstrate how to clean a clarinet	Explain why one of the two boats is much lower in the water than the other
REMEMBER	What is the value of pi?	Define positive reinforcement	What are the steps in balancing a checkbook?	Explain the three techniques used to make projection maps of earth's surface
	FACTS	CONCEPTS	PROCEDURES	PRINCIPLES

Figure 1. Performance-Type of Content Matrix

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	EXPOSITORY (TELL)	INQUISITORY (QUESTION)
GENERALITY	A square is a closed figure with 4 equal sides.	Give the definition of a square.
INSTANCE	Here is a square:	Is this a square?

Figure 2. Abstraction-mode matrix.

		EXPOSITORY MODE	INQUISITORY MODE
FIND			PPF*: 1) Give *several* problems that require finding solutions. SPF+: 1) Give *new* problems leading to *new* solutions. 2) For feedback, have students test each other's solutions.
USE		PPF: 1) State definition, list of steps or principle. 2) Illustrate generality with *several* examples. SPF: Give background info, review prerequisites and include attention focusing cues as necessary.	PPF: Give *several* problems. SPF: 1) *Vary* representation of problem and do not repeat them. 2) Provide feedback that includes why an answer is right or wrong.
REMEMBER	VERBATIM	PPF: Give facts, concept, procedure or principle or example of them depending upon which is to be memorized.	PPF: 1) Ask for exact recital. 2) Require recognition of an exact duplicate. SPF: Indicate with feedback if recall or recognition was correct.
	PARAPHRASE	PPF: Give fact, concept, procedure of principle and *one* example.	PPF: 1) Ask for a paraphrased recital. 2) Require recognition of different representation of the same thing. SPF: Indicate with feedback if recall or recognition was correct.

*primary presentation form
+*secondary presentation form*

Figure 3: Minimum prescriptions for primary and secondary presentation forms.

3. Embellish primary practice forms with secondary presentations, especially feedback. Match the feedback to the level of performances and type of content.

4. Systematically vary non-relevant attributes of instances; make the set of instances as diverse as possible.

5. Gradually increase the difficulty of the practice.

6. Clearly separate and identify practice presentations from other primary and secondary presentations.

7. In many circumstances, give students freedom to choose the number of practice presentation forms in the overall instructional sequence.

Recommendations for the Design of Practice Derived from Cognitive Research

There are several issues arising from recent research in cognitive learning theory which are not incorporated *per se* in any instructional theory. This section summarizes these issues and their implications for designing practice.

Automaticity

One important issue relevant to the design of practice activities which is not discussed in any of the instructional theories reviewed is the issue of automaticity. Automaticity refers to the state at which a skill ceases to consume much of the attentional capacity of the brain. This means that an automatized skill can be performed simultaneously with other tasks without interfering with the performance of those tasks. People commonly automatize skills such as typing, discriminating numbers from letters, or decoding common words.

Current research suggests that the performance of complex skills such as reading, computer programming, or mathematical problem solving requires that many of the subprocesses become automaticized (Anderson, 1980). It is not sufficient that these subprocesses be performed correctly—they must be brought to a state of automaticity or the performance of higher-level tasks is impaired (Lesgold, 1983; Lesgold & Resnick, 1982; Resnick & Ford, 1981).

Practice drills intended to promote automaticity include three stages. The first stage helps the student learn to perform the skill *accurately*. The second stage introduces speeded practice and continues until performance is both *fast* and *accurate*. The third stage requires students to attend to a competing task while continuing to perform the original task until performance becomes *fast, accurate*, and *automatic*.

Interference

Most instructional theories emphasize how to teach a single fact, concept, rule, or procedure. They do not give specific recommendations on how to design practice for many facts, concepts, rules, or procedures. Consequently, these theories do not thoroughly consider the issue of interference.

> In order to perform complex intellectual skills such as reading, computing, or computer programming, many of the subskills involved have to be automatized.

Interference occurs in practice activities involving many similar items. Interference occurs when students confuse one stimulus-response association with other stimulus-response associations. One type of interference, where new associations interfere with old ones, is referred to as *retroactive* interference. Another type of interference, where old associations interfere with the formation of new ones, is referred to as *proactive* interference. Both kinds of interference increase with the number of items to be practiced. Consequently, special considerations must be made for designing practice involving voluminous subject matter.

Designers can reduce the amount of interference present in a practice exercise by following a few simple guidelines:

1. Rather than having students work on all of the content at once, have them practice a small subset of the content. By practicing on a small subset of the content, the amount of interference is reduced. Group the content to be practiced into subgroups to be practiced separately, or introduce new material progressively as old material is mastered.

2. Since the strength of an association is weakened by the learning of new associations, review old items or material as new material is introduced.

3. Compare and contrast similar practice items with special cues so that the student can observe and note the differences. This is particularly useful when items are initially presented in a drill. As the drill progresses, eliminate the cues completely.

Spacing of Practice Sessions

There is much evidence in the literature to suggest that short, spaced periods of practice give better results than long concentrated practice periods (Anderson, 1980). Studies on the effects of spacing have shown that the probability of recall of items increases proportionally with the spacing between practice periods (Gay, 1973; Madigan, 1969). This spacing effect appears to be very robust and occurs with many different types of material. Bray (1948), for example, reported an experiment which showed that students could learn the Morse code with four hours a day of practice as rapidly as students who practiced seven hours a day. Students who practiced seven hours a day were apparently wasting the additional 3 hours of practice they were receiving per day. The reason spaced practice is considered to be more effective than massed practice is that the learning context on each occasion is somewhat different thus causing the information to be encoded somewhat differently each time. Also, by breaking up practice sessions into several spaced sessions, students experience less fatigue and boredom.

This evidence suggests that practice activities should be designed so that students can stop in the middle of a practice session or drill and then resume at a later time picking up the same items or material that they were working on during the previous session. In some cases, this can be done by dividing the content into difficulty levels and allowing the students to specify the appropriate difficulty level at the beginning of each new session. In other cases this requires that

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a record be kept of student performance from session to session. This record would contain the data necessary to allow students to restart the practice or drill using the items or material that they were working on during the previous session.

Spacing of Review Sessions

Spaced review has been shown to be a significant means of enhancing retention of learned material. For example, Tiedeman (1948) found that after two spaced reviews students retained for 63 days the same amount of information they would have retained for only one day without the reviews. Gay (1973) demonstrated the superiority of an early and late review over two early or two late reviews. Other studies have shown these same superior effects for spaced review over massed review (Ausubel & Youssef 1965; Hannum, 1973; Peterson, Ellis, Toohill, & Kloss, 1935; Saxon, 1981).

The research on spaced review suggests that designers should provide for several reviews of mastered material and that each successive review be spaced farther apart than the previous review. This can be done by setting up a series of review stages allowing mastered material to be reviewed at different stages, say after a day, then after two days, then after a week, then after ten days, etc. Practice drills should provide increasing-ratio review where the ratio of new items to review items changes as students progress through the drill. When students first begin the drill all items will be new items. As students master items, these become review items and are re-introduced systematically. Toward the end of the drill most of the items presented to the students will be review items. Drills structured in this way can be very effective for the purpose of skill maintenance in addition to initial learning.

Making Meaningless Material More Meaningful

There is much evidence to indicate that people remember meaning and relationships rather than exact details. For example, Wanner (1968) had students listen to tape-recorded instructions and then, in a test, compare several alternative sets of instructions with the one they heard. Results showed that students could identify word changes which resulted in changes of meaning, but could not identify word changes which resulted only in changes of style. The same point has been demonstrated in experiments which have contrasted memory for meaningful sentences with that of memory for random word strings revealing that people remember the meaning rather than the exact wording of a verbal communication (e.g. Pompi & Lachman, 1967).

The superiority of memory for meaning over memory for details is accounted for by the idea of *propositional representation* which is currently one of the most popular concepts of how material is represented in memory. According to this conception, material is stored in memory in the form of propositions which include only the meaningful parts of an event or learning task and do not include details considered to be unimportant (Anderson, 1976). Students tend to exclude from their propositional representations material

Table 4
Recommendations for the Design of Practice Derived from Cognitive Research

Issues	Recommendations
Automaticity of subskills	In addition to accuracy, speed and the ability to perform the skill without interfering with a secondary task should be used as criteria for mastery.
Interference	Have students drill on only a small subset of items at a time. Provide review of old items as new ones are introduced. Initially use cues to emphasize differences among competing stimuli and then fade the cues gradually.
Spaced Practice	Allow students to specify the difficulty level at the beginning of each session or provide a mechanism to keep track of the items that a particular learner was working on during the last session.
Spaced Review	Gradually increase spacing between practice of mastered items. Utilize increasing ratio-review.
Making Meaningless Information Meaningful	Help students add meaning to the material by utilizing mnemonic devices, mediators, or other memory or organizational strategies, or emphasize networks inherent in the content.

deemed unrelated or to which they cannot give meaning.

Because students can remember meaningful information better than meaningless information, instruction should seek to make material as meaningful as possible. Therefore, the objective of a good practice drill should not be just to "burn it into memory" but to convert a learning task which may not have much inherent meaning into something more meaningful. Several strategies students can use to give meaning to material have been researched by Dansereau (1978), Weinstein (1978, 1982), and Vaughn (1981). Some of these strategies are: (a) *paraphrase-imagery* (intermittently rephrasing material in own words and forming mental pictures of the concept); (b) *networking* (forming networks or mode-link maps, hierarchies, or chains which help students see relationships among concepts); (c) *analysis of key ideas* (identifying key ideas in the material); (d) use of *analogies* for recalling connected discourse; and (e) use of *grouping, segmenting, sequencing,* or *acronyms.* These strategies can either be taught to students or can be provided as part of the practice activity. Whichever is done, efficient practice activities should make use of these strategies where applicable. Other memory devices such as mediators, mnemonics, keywords, and loci (associating material to be learned with spatially organized objects and places) have been shown to help impose some artibrary meaning on otherwise meaningless material. The power of these techniques in improving memory of meaningless material has been consistently demonstrated (Atkinson & Raugh, 1975; Gilbert, 1978; Higbee, 1977; Bower, 1970a, 1970b, 1970c). Table 4 summarizes the issues discussed in this section and provides relevant recommendations for the design of practice activities.

Keller's Motivational-Design and Practice

It is widely accepted that motivation plays a role in how much a student learns. Even though this notion is believed to be true, some of our current instructional theories fail to address motivation as a part of the design process. Where does one look to find an instructional design theory which includes recommendations and precriptions for making instruction more motivating?

John Keller's motivational design model (Keller, 1979; 1983; in press) specifically focuses on this aspect of instruction—how to make instruction more motivating and engaging for students. Keller's model draws together knowledge from various theoretical perspectives into a set of prescriptions for making instruction more motivating and engaging. As defined by Keller (in press), "motivational design is an aspect of instructional design which refers specifically to strategies, principles, and processes for making instruction appealing." Motivational design adds another dimension to the traditional idea of instructional design. Instructional design shows us what instruction should be like in order to be effective and efficient. Motivational design shows us what instruction should be in order to be interesting and appealing.

> The objective of a good practice drill should be to convert a learning task which does not have much inherent meaning into something more meaningful.

Four basic categories of conditions which designers should consider in order to produce motivating instruction are presented in Keller's model. These four categories are: *attention, relevance, confidence,* and *satisfaction.* Within each category, Keller offers strategies for making instruction more motivating. What follows is a brief description of these four categories along with some sample strategies that can be incorporated into practice activities to make them more motivating.

Attention

A first step in motivation is to gain and maintain the learners attention. As a motivational variable, attention involves several theories of curiosity and arousal. According to Keller (1983), attention is a state which exists when something unexpected occurs in a person's perceptual environment, or when there is a gap between a given and desired state of knowledge. Several motivational strategies to enhance attention can be applied to the design of practice activities. These include:

- Varying the amount of participation, so students can actively practice in challenging, yet safe situations (games, simulations, role-playing)
- Presenting a paradoxical example of a concept or problem in a practice situation
- Varying the overall style of the presentation so that the style changes from fast to slow, active to passive, or humorous to serious,
- Having students engage in practice that allows them to act on their curiosity by exploring and manipulating their environment

Relevance

In order to have sustained motivation, the learner must perceive that important personal needs are being met by the learning situation (Keller 1983). After having his attention aroused, a person will question the relevancy of a situation before becoming highly motivated. Motivational strategies to increase the relevancy of a practice situation include:

- Relating the content of practice items to the student's interests and past experiences
- Stating explicitly how the practice relates to future activities of the student
- Providing an opportunity for students to practice under conditions of moderate risk so they can achieve standards of excellence
- Providing meaningful alternative methods of practice for students to accomplish a goal

Confidence

The idea of confidence relates to the belief that an individual's attitudes toward success or failure have a causal influence on his actual performance of an activity. A positive expectancy for success is the third requirement for motivational learning. Practice activities, as well as other instruction, should include strategies to enhance the learner's confidence. This can be done by:

- Clearly stating the expected performance and evaluation standards of a practice activity
- Structuring practice material so it is presented in identifiable units
- Beginning a practice session with the more easily obtainable skills
- Providing feedback that supports student ability and effort as the determinants of success in a practice setting
- Redesigning practice items and activities which frequently cause failure

> Different instructional theories often use different terms to refer to the same phenomenon which tends to make the knowledge base appear more complex than it really is.

Satisfaction

The concept of satisfaction refers to the idea that learners must feel satisfied that the rewards gained from an activity are consistent with their expectations. Furthermore, an individual must believe that the outcomes of success are directly related to performance on a particular activity. Some strategies to enhance learner satisfaction are:

- Providing an opportunity to practice using a newly acquired skills in a realistic setting as soon as possible
- Allowing those who have mastered a skill to help others practice that skill
- Rewarding intrinsically interesting practice task performance with unexpected non-contingent rewards, and boring practice tasks with extrinsic, anticipated rewards.

Summary and Conclusions

Several prominent instructional design theories are reviewed in this paper and recommendations and prescriptions for designing the practice component of instruction are derived from them. The following general findings and conclusions can be stated based upon this review.

First, the instructional design theories reviewed are generally complementary in nature rather than contradictory. Many of the guidelines derived from one theory are supported by several of the other theories. Different terms are often used to refer to the same phenomenon in different theories which tends to make the knowledge base for designing practice to appear more complex than it really is. However, it is also evident that each theory provides some unique contributions which have important implications for the design of practice. Therefore, in order to design optimally effective practice, the instructional designer will need to be familiar with all of the instructional design theories reviewed, not just one of them.

Second, classifying tasks into *types* or *categories* of learning does reveal important differences in the application of the recommendations and prescriptions. In some cases, the differences among categories of learning for a particular recommendation are minor but in other cases the differences are critical to effective learning.

Third, there are several areas of research in cognitive learning theory which are not formally treated in any of the instructional design theories reviewed. These areas of research have important implications for the design of practice. These areas include automaticity, interference, spacing of practice and review, and the use of memory devices and learning strategies. Further development of instructional design theories should more formally incorporate findings from these areas of research.

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Systematic Lesson Design for Adult Learners

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Abstract. It has often been the mistake of educators to treat instruction for adults like instruction for children. In recognizing adults as the unique learners they are, characteristics of adult learners are integrated with the lesson design level of the Gagne-Briggs model of instructional design to produce a design model which accommodates adult learning. The implications of learner characteristics such as experience, motivation, physiological barriers, psychological barriers, and memory are indicated for the components of the model, including objectives, instructional events, conditions of learning, media, and assessing learner performance. It is concluded that the Gagne-Briggs design model can be extended to a more holistic view of learning by attending to specific characteristics of adult learners.

Though much of the instruction developed by instructional designers is for adult learners, the fields of instructional design and adult education have quite different philosophical and theoretical emphases. The adult educator's approach to learning is frequently a combination of various philosophies of adult education with a primary emphasis on humanism. In humanistic adult education, the key ideas are related to "freedom and autonomy, trust, active cooperation and participation, and self-directed learning" (Elias & Merriam, 1980, p. 10). As presented here, instructional design is based on cognitive, particularly information-processing, and behavioral theories of learning. Given these different views of learning, approaches to instruction by adult educators and instructional designers differ significantly. Some adult educators do not believe the use of systematic instructional design will create the most efficient learning outcomes for adult learners because the theories on which it is based represent a less than holisitic view of learning (Apps, 1981).

The model for lesson design presented in this paper is basically that of Gagne and Briggs (1979) where a lesson is defined as "the smallest unit for which instruction is usually planned" (Briggs, 1977, p. xxii) and, as "the formal presentation of instructional stimuli to the learner" (Briggs and Wager, 1981, p. 137). The lesson level of instructional design consists of four stages:

1. Definition of Performance Objectives
2. Preparing Lesson Plans (or Modules)
3. Developing, Selecting Materials, Media
4. Assessing Student Performance (Gagne & Briggs, 1979, p. 23)

These stages do not exist independently of each other; hence it is somewhat difficult to discuss any one stage as distinct from the others. I have attempted to integrate characteristics of adult learners with each stage separately to make this information more readily applicable to the instructional designer who wishes to use it; however, some overlap remains.

The design model is intended for general application to a broad range of learners. Though determining learner characteristics is considered a component of the entire model (Andrews & Goodson, 1980) no procedures are presented to operationalize this component at the lesson design level. The designer takes responsibility for utilizing the design framework in view of the characteristics of the target group for which the instruction is being designed. The designer identifies the gross characteristics in the needs analysis; however, these are not the specific learner characteristics which may affect the design of lessons or materials.

Increased attention to the characteristics of learners has been identified as a future trend in the implementation of instructional systems (See Dick, 1981). As an instructional designer, there is no particular reason to believe that designing instruction should be totally different for adults than for youth since the learning and memory structure is considered to be the same for both. However, designers continue to make the mistake of treating instruction for adults like instruction for youth with little or no consideration of the characteristics of adults which have an impact on the teaching/learning process. In view of the fact that adults do possess many characteristics specific to how they learn, I believe that the Gagne-Briggs design model can be extended to account for those characteristics so we can design more effective instruction for adults.

Various definitions of "adult learner" have been proposed in the literature (See *Verner, 1964; Knowles, 1978; Cross,* 1979; Apps, 1981). For the purpose of this paper, adult learners are broadly defined as persons who are 22 or older and who are participating in a purposeful, planned learning experience after being removed from such an experience for at least two years. Such a learner may be participating in a single experience or a program related to higher education, basic skills, or leisure time. Participation may be for personal or professional reasons, and the activity may be credited or non-credited.

The characteristics of adult learners are those which have been identified by numerous educators and researchers in adult learning. A selected few prominent sources will be cited. These characteristics which are addressed are related to factors such as memory, reaction time, motivation, learning strategies, psychological barriers, and experience, and have been the basis for adult learning principles.

This attempt to synthesize procedures for systematic lesson design and principles of adult learning might be viewed as an attempt to integrate the humanistic with the cognitive and behavioral approaches to learning. Such a synthesis has not been evident in the literature. Each section presents some assumptions of the Gagne-Briggs design model and characteristics of adult learners relevant to aspects of the design model. Implications for instructional lesson design are noted with a bullet (•) throughout and summarized in the tables.

Defining Performance Objectives

Designers are well aware that lesson design begins with defining the objectives and they base subsequent lesson design decisions on the performance objectives which they have defined for the lesson. Needless to say, unless objectives are pre-set, a lesson cannot be systematically designed to achieve particular outcomes.

Briggs indicates that the role of the designer may be limited to this stage of lesson design when he states: "For adult learners such as graduate students, it may be necessary to agree upon the objectives; then the student teaches himself'" (1977, p. 195).

The characteristics of adult learners which affect defining performance objectives include their motivation and their approach to the learning experience. Adults often have multiple motives or reasons for participating in learning experiences. In reporting the data from state studies, Cross (1979) presents a typology of motives along with the percentage of potential learners who reported such motives:

(a) practical goals (increase in income, job promotion, new job)—about 50%

(b) personal satisfaction or inner-directed personal goals—about 50%

(c) to gain new knowledge (including learning for its own sake)—about 50% to about 75%

(d) to achieve formal educational goals (degrees, certification)—about 8% to about 28%

(e) to socialize—about 33%

(f) to achieve societal goals—about 25%

Related to these motives is the adult's approach to learning. Knox (1977) states: "Most adults approach learning activities with expectations about what they will gain from the experience" (p. 425).

When defining performance objectives for adult learners:

- Explore the learners' expectations regarding what they expect to gain from the learning experience (Knox, 1977).
- Keep objectives realistic so that they are not overwhelming yet they remain challenging (Knox, 1977).
- Remain open to compromising your expectations with those of the learners so that the learners will not be so dissatisfied that they don't wish to achieve the objectives (Knox, 1977).
- Sequence objectives so that as many as possible are independent of each other. You can then present the learner with options regarding the order in which objectives will be achieved. Such options provide the learners with more involvement with objectives than they would have with a highly sequenced set of objectives. Of course this strategy is only available when the nature of the learning outcome does not require hierarchical sequencing.
- If the learners are to be on their own once objectives are agreed upon, anticipate objectives which may be of interest to them, so that materials can be prepared to help them meet these objectives. Such materials may include self-instructional packages which either contain all the materials needed by the learner, part of the materials with referral of the learner to other sources, or total referral of the learner to other sources.

> "It has often been the mistake of educators to treat instruction for adults like instruction for children."

Preparing Lesson Plans

At this stage of the lesson design process, the designer writes prescriptions for the instructional events in the lesson. Basing each prescription on the conditions of learning for the learning outcome stated in the objective, the designer describes the media and the teacher and learner activities which will operationalize the instructional events. Though the instructional events are the same for each type of learning outcome, the specific conditions of learning differ for the different kinds of learning identified by Gagne (Gagne & Briggs, 1979). Briggs suggests that in addition to being specific for each instructional event, certain conditions of learning may be diffused throughout a lesson. Since the conditions of learning are a way of operationalizing the instructional events, they are also supportive of the internal processes of learning and memory.

What I think has been overlooked by instructional design due to its adherence to cognitive and behavioral theories is the potential for conditions of learning which support other aspects of learning—social, emotional, and physical aspects. For those designers using the lesson design component of the Gagne-Briggs model of instructional design, integrating the characteristics of adult learners with instructional events and conditions of learning can result in practical, useful information for designing lessons. By attempting the integration at a general level, I am proposing that learner characteristics in addition to, but not unrelated to, memory and learning processes are relevant bases for determining conditions of learning that promote effective, efficient learning.

The characteristics of adult learners support or indicate certain instructional events while at the same time indicating conditions of learning for those events. The section of this paper entitled "Instructional Events" presents those events as well as concomitant conditions of learning implied by certain characteristics of adult learners. The following section, "Conditions of Learning," presents characteristics of adult learners which imply certain conditions of learning and then that indicates the instructional events to which these conditions may be applicable. This organization results from the notion that certain characteristics of adult learning have implications for events first and conditions of learning second; and other characteristics have implications for conditions of learning first and events second.

Instructional Events

The instructional events of the Gagne-Briggs (1979) model of instructional design are:

1. gaining attention

2. informing the learner of the objective
3. stimulating recall of prerequisites
4. presenting the stimulus material
5. providing learning guidance
6. eliciting performance
7. providing feedback
8. assessing performance
9. enhancing retention and transfer

Characteristics of adult learners which hold implications for the instructional events of a lesson include learner sophistication, motivation and expectations for participating in a learning experience, the value placed on incidental learning, experience, and learning strategies.

> "Social, emotional, and physical aspects of learning have been overlooked by instructional design."

Briggs (1977) states that the teacher or designer decides which events to supply for learners and which the learners may provide for themselves. He also suggests that adult learners can provide more events for themselves so that fewer events are provided by the teacher or class activities. Briggs is probably referring to learner sophistication which does not necessarily result from age. In addition, factors such as available time, ready access to resources, and self-directedness will affect whether or not adults provide themselves with the events needed to facilitate effective instruction. In planning for which events to include in the lesson, the designer should consider whether or not the learners are knowledgeable and skilled enough to organize and carry out their learning activities and whether or not they have the time and resources to do so.

Some characteristics of adult learners support the need for providing certain instructional events and others call for extending these events to account for the characteristics. I will illustrate this idea by examining most of the events.

Informing the learner of the objective. Instead of "informing the learner of the objective," the designer may think of this event as "choosing the objectives." Choices by the learner can contribute to interest, achievement, and application of the learning (Knox, 1977). Specific conditions of learning related to the event of choosing objectives include:

- Provide questions, prompts, organizers, or directions to guide attention when helping learners set realistic objectives (Knox, 1977).
- Help learners establish connections between known information and new information when helping learners define objectives (Knox, 1977).
- Provide examines in the form of a human role model, or a diagram or verbal description to help the learners clarify their expectations (Knox, 1977).

Adult learners place a high value on incidental learning. The gradual decline in incidental learning for older adults may mean that older adults adapt by concentrating on relevant cues and ignoring irrelevant ones or, that the older adult loses previously acquired information related to the new learning; therefore, information which could have served to enhance understanding or establish connections is not available (Knox, 1977). In order not to stifle incidental learning by emphasis on performance objectives, provide conditions of learning which are diffused throughout the lesson:

- Keep each task as simple as possible, breaking complex tasks into a series of simple tasks when possible (Knox, 1977).
- Pace slowly (Knox, 1977).
- Emphasize relevant cues (Knox, 1977).

Stimulating recall of prerequisites. This event may be extended to "stimulating and assessing recall of related learning." Through previous learning and life experience, adults may have gained knowledge and skills which they can draw upon to facilitate learning new content. A further extension of this event is stimulating and assessing recall of cognitive structure. Older adults have had more time to develop detailed cognitive structures, and if these cognitive structures are inadequate they may interfere with effective learning (Knox, 1977). The adult's cognitive structures may be based more on experience than on the structure of content (Knox, 1977).

- Provide activities to assess recall of related learning, so that the learners can find out what is familiar and unfamiliar to them.
- Branch learners to unfamiliar areas.
- Provide an option for review of familiar areas.
- Diagnose how topics and problems are viewed (Knox, 1977).

Providing (Pre-)Learning Guidance. Though this event ordinarily occurs after the stimulus material has been presented, some characteristics of adult learners call for attention to learning guidance prior to presenting the stimulus. Thus it may be re-named as pre-learning guidance. Learning strategies, cognitive structure, and related learning of adults receive attention here.

Adults tend to acquire more learning strategies with age; but, older adults tend to rely on those strategies already held rather than to acquire new ones (Knox, 1977).

- Help older adults modify their learning strategies or increase their repertoire of learning strategies. For example: the learner has some knowledge of a topic, begins reading materials from beginning to end at a steady pace and then goes to the next activity. The suggested alternative for the learner might be to skim the materials with particular attention to main ideas identifying that with which they are and are not familiar and giving most of their attention to the unfamiliar (Knox, 1977).
- Include an objective in the lesson which would address learning strategies. Intersperse instruction for such an objective with other lesson objectives.
- Present the learner with a variety of optional strategies regarding how to learn the material being presented.

Knox (1977) suggests that adult learners be assisted in building cognitive structure. Frankly, I don't have much to suggest, and Knox only suggests two generalities:

- Base attempts at building cognitive structure on the assessment of how topics and problems are viewed. (Knox, 1977).
- Present questions and basic ideas (Knox, 1977).

Knox reports that studies of adult problem-solving have indicated that problem-solving effectiveness requiring novel solutions declines with age. The accumulation of solutions over the years

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forms a reservoir of solutions from which older adults tend to draw solutions rather than generate novel solutions.

- Help older adults compensate for deteriorations in problem-solving performance which result from interference from previous learning by assisting them in identifying prior ideas or practices that need to be unlearned and providing opportunities for such unlearning (Knox, 1977). Though unlearning is recognized as a sometimes necessary process, little if anything is known about how to assist learners with it.

Eliciting Performance, Providing Feedback, Assessing Performance. Knox (1977) reports that the adult's perception in attending to detailed and complex learning situations may be both useful and detrimental. The familiarity with information may enable the learner to use selective perception accurately or it may result in misunderstandings.

- Assess learning frequently to catch misunderstandings that may lead to cumulative failure (Wager, 1977).
- Relate feedback to progress toward goals. According to Kidd (1973), when the learning experience is voluntary, motivation for the adult learner is dependent on the adult being convinced that progress is being made toward his goals.
- Utilize peer review in providing feedback (Knox, 1977).
- Utilize comparisons with external standards in providing feedback (Knox, 1977).

Enhancing retention and transfer. If any event is likely to be left out of a lesson, it is that of enhancing retention and transfer. Since "adults usually engage in purposeful learning because they want to apply or transfer what they learn to a variety of conditions beyond the one in which the learning occurred" (Knox, 1977), this is a particularly important event for adult learners.

- Provide experiences in which learners can plan and rehearse the application of what was learned to daily life (Knowles, 1980).

Table 1 summarizes the instructional events and some specific and diffused conditions of learning for the events.

Table 1
Instructional Events and Conditions of Learning Indicated by Adult Learner Characteristics

Instructional Events	Conditions of Learning	
	Diffused	Specific
Gaining Attention* Choosing the Objective	Break complex tasks into series of simpler tasks. Pace slowly. Emphasize relevant cues. Intersperse activities related to learning strategies. Make resources readily available.	Provide questions, prompts, organizers, directions to guide attention in setting realistic objectives. Assist learner in establishing connections between known information & what is to be learned. Assist learner in clarifying expectations using human role model, diagram, or verbal description. Provide learner with life-long objective.
Stimulating (& Assessing*) Recall of Prerequisites* of Related Learning Of Cognitive Structure		Pre-test for related ideas. Identify ideas & practices that need to be unlearned.
Providing Pre-Learning Guidance Unlearning Building Cognitive Structure Learning Strategies		Provide opportunities for unlearning. Present learner with a variety of optional learning strategies. Provide questions and basic ideas regarding cognitive structure.
Presenting the Stimulus*		
Providing Learning Guidance*		
Eliciting Performance*		Elicit performance frequently.
Providing Feedback*		Provide feedback regarding progress frequently, including extent & type of change in competence.
Assessing Performance*		
Enhancing Retention & Transfer*		Provide opportunity for learner to plan & rehearse application of learning to daily living.

*events proposed by Gagne & Briggs.

Conditions of Learning

There are a number of characteristics of adult learners which have implications for conditions of learning. Such characteristics are related to memory, experience, reaction time, and psychological barriers. Though conditions of learning are considered to be different for different types of learning (Gagne & Briggs, 1979), I have not made this distinction here. I consider the conditions of learning identified from experience and psychological barriers to be generalizable to different learning outcomes. Those conditions related to memory and reaction time may best be suited to verbal information learning since most of the research in these areas has been with verbal learning.

Memory. Knox (1977) describes problems adults have with memory (based primarily on studies of short-term memory) and gives some suggestions for practitioners regarding how to help adult learners overcome memory problems in learning. He describes three phases of memory: registration (exposure to stimulus, acquisition of information, encoding), retention (persistence of encoded information), and recall (search and retrieval).

As age increases, there is an increasing registration deficit whether the stimulus is presented visually or auditorily with the deficit being greater for the visual than for the auditory. Information which is highly organized during the registration phase is more likely to be remembered. The strength of the registration also affects how well it is remembered. Strong registration occurs when the stimulus is presented at spaced intervals where the intervals are short and adequate time for attending is provided without distraction.

There is little decline in retention ability as age increases as long as what has been stored is meaningful, accurately coded, and not excessive in amount.

As age increases, there is some decline in recall ability, particularly for older adults with low verbal ability. Recall is greatest when the material is meaningful and when the recall conditions are similar to the conditions under which the material was registered. Much of the decline in recall results when the adult is trying to store and respond to new information and recall old information at the same time. The process of recalling old information interferes with the new information. Even greater interference may occur when the older adult increases the time spent in searching through accumulated information. It has also been found that errors in recall are more often errors of forgetting than mistakes.

Knox (1977) states that factors related to memory seem to contribute to a decline in problem-solving performance for older adults. These factors include decline in short-term memory, and increased difficulty in organizing complex material, and in disregarding irrelevant aspects in the learning situation. Some of the ways he suggests for practitioners to help adults compensate for memory deficits and deterioration in problem-solving performance may serve as conditions of learning.

- Provide memory aids, e.g., paper and pencil for taking notes, lists of needed information for ready reference and summary materials.
- In presenting new information, use aids that help the learner organize the information, e.g., advance organizers, sets of categories, and generalized structures to assist in grouping information.
- Minimize distracting and irrelevant information and activities in the learning materials and setting.
- Review prerequisite ideas from prior lessons.
- Pace the learning for mastery and continuity.

Table 2 contains both specific and diffused conditions of learning based on research about adult memory. These conditions of learning are suggested for use by designers in conjunction with those posed by Gagne and Briggs (1979, p. 166), and by Briggs (1977, pp. 275-277). It should be noted that certain conditions derived from research and from Knox' suggestions overlap with those of Gagne and Briggs.

Table 2
Conditions of Learning Derived from Research on Adult Memory

Instructional Events	Conditions of Learning	
	Diffused	Specific
Gaining Attention Choosing the Objective Enhancing Retention & Transfer	Minimize distracting & irrelevant information and activities.* Pace for mastery and continuity.*	
Providing Pre-Learning Guidance		
Stimulating Recall		Review prerequisite ideas** from prior lessons.*
Presenting the Stimulus		Present information in small chunks Use aids to help learner organize material.* Allow adequate time to attend.* Present information in different ways to overcome interference.
Providing Learning Guidance		Provide memory aids.* Provide meaningful context.**
Eliciting Performance		Have learner recall in situation similar to that in which stimulus presented. Use measure of cued recall.
Providing Feedback		Identify accuracy/inaccuracy.**
Assessing Performance		Self-pace to allow time for search.
Enhancing Retention & Transfer		Provide spaced reviews** with short intervals in between. Provide summary materials.*

*Indicates Knox's suggestions.
**Indicates overlap with Gagne & Briggs.

Experience. One of the most distinctive aspects of adult learning is the wealth of experience adults bring to the learning situation. Kidd (1973) states that, to some, experience is the principal factor in adult learning. He notes three factors about adult experience as distinct from the experience of children:

1. Adults have *more* experiences
2. Adults have different *kinds* of experiences
3. Adults' experiences are *organized differently*. (p. 46)

Adult educators emphasize the importance of the adult's experiences for teaching and learning:

> The resource of highest value in adult education is the learner's experience . . . . Too much of learning consists of vicarious substitution of some one else's experience and knowledge . . . . In teaching children it may be necessary to anticipate objective experience by uses of imagination but adult experience is already there waiting to be appropriated.
> (Lindeman, 1961, pp. 6-7.)

Knowles includes the role of experience as a main assumption in adult learning theory:

> This assumption is that as an individual matures he accumulates an expanding reservoir of experience that causes him to become an increasingly rich resource for learning, and at the same time provides him with a broadening base to which to relate new learning... to an adult, his experience is *who he is*. (1978, p. 56.)

Two types of experience that have an impact on adult learning are: experience which is a function of fulfilling adult roles (life experience), and experience related to feelings and ideas arising from pre-adult learning encounters. Bergevin, McKinley, and Smith (cited in Apps, 1981), call the combination of these two kinds of experience "internal knowledge," as opposed to "external knowledge," which is what is to be learned (p. 76).

Life experience and experience with prior learning (adult or pre-adult may have positive or negative effects on a new learning experience. Apps (1981) points out that having a large amount of life experience often causes paradoxes for adult learners on examinations because it is difficult for them to choose a single answer.

Knowles (1980) addresses the implications of adult experience for educational practice. Some of these implications can serve as conditions of learning in designing learning experiences for adults:

- Emphasize practical application by illustrating new concepts and ideas with life experiences drawn from the learners.
- Build experiences into the lesson which help adults learn to learn from experience by providing opportunities for them to look at themselves more objectively and to free their minds from preconceptions.
- Gear presentation of resources to the levels of experience of particular

learners.

- Help learners apply new learning to their experiences to make learning more meaningful and integrated.

Experience with prior learning, both adult and pre-adult, has implications as diffused conditions of learning since these experiences will determine the learners' attitudes toward the learning situation and the style with which they approach the learning situation.

- Provide a supportive atmosphere, and establish a cooperative relationship between the learner and the instruction to facilitate positive attitudes toward learning.

Life experience in particular has implications for specific conditions of learning. Table 3 contains the conditions of learning implied by the wealth of experience the adult brings to the learning situation.

Table 3
Conditions of Learning
Derived from Wealth of Experience

Instructional Events	Conditions of Learning	
	Diffused	Specific
Gaining Attention	Provide supportive atmosphere, cooperative relationship.	Tell of a work or life experience that relates to the concent to be learned, or elicit such an experience from the learners.
Informing the Learner of the Objective, or Choosing the Objective		Provide opportunity for learner to free mind from preconceptions about learning.*
Stimulating Recall of Prerequisites		Have learner recall experiences that involve required or related prerequisites.
Presenting the Stimulus		Gear presentation to learner's level of experience.* Present information or skills in context of life or work situations drawn from the learners. Help learner establish connections between organized material & personal experience.*
Providing Learning Guidance		Use examples of work or life experiences as cues, prompts, links.
Eliciting Performance		
Providing Feedback		Reinforce use of work or life experience in new learning.
Assessing Performance		Ask learner to apply information or skills to past experience. Provide an open-response assessment
Enhancing Retention & Transfer		Have learner speculate upon how new learning could have changed past experiences, or may change future.

*Knowles

Reaction Time. Knox (1977) describes reaction time as the time it takes to respond to a stimulus, and as involving stimulus perception, transmission of information to the brain, and response selection. He describes changes in reaction time as a result of physiological changes in the brain and nervous system: In young adulthood, at about the age of twenty, reaction time peaks; in middle and old age, it slowly declines. Adults compensate for their reduction in reaction time by giving increased attention to accuracy, by carefully attending and responding to stimuli, and by avoiding situations that involve time pressures and potential surprises.

- Avoid placing the adult in timed, high pressure situations (Apps, 1981).

Related to reaction time is the speed or pace of the learning situation:

> The speed or pace at which learning occurs is one of the major age-related influences on adult learning effectiveness. Adults of any age, but especially older adults learn most effectively when they set their own pace, take a break periodically, and fit the distribution of learning episodes to the content. (Knox, 1977, p. 440.)

- Help adults improve speed and accuracy by providing clear instructions and reinforcement procedures (Knox, 1977).

One of the reasons for using instructional events and conditions of learning in designing lessons and materials, particularly of the self-instructional type, is to promote efficiency in learning. Apps states:

> For those instructors who hold efficiency in learning as a major guide for their activities, rethinking is necessary. Efficiency, meaning in this instance the speed at which learning can take place, is a problem for the adult learner. (1981, p. 87.)

Perhaps by accounting for the adult's slower reaction time in the conditions of learning used to design lessons and materials, designers can increase learning efficiency for the adult learner. The specific and diffused conditions of learning implied by the adult's slowed reaction time appear in Table 4.

Psychological Barriers. Apps (1981) identifies three psychological barriers of adults that interfere with learning: guilt feelings, recall of previous formal learning, and lack of confidence as a student.

The adult's feelings of guilt about the effects of his role as a student on his family (e.g., less time with family, less money coming in) cannot be dealt with as conditions of learning for just any type of content. However, in the event of enhancing transfer, opportunities could be provided that assist the learner in transferring the new learning to family situations when the content is appropriate for such transfer.

Recall of previous formal learning has been mentioned earlier in this paper as a part of experience which could have positive or negative effects on learning. Diffused conditions of learning were suggested to enhance positive attitudes toward the learning situation.

Lack of confidence as a student manifests itself in the adult learners' doubts about their ability to study and capacity to learn. Many adults fail to see that they are already learners in the informal learning situations in which they participate as parents, members of a community, and professionals. By drawing upon the experiences of adults in real-life learning situations, we can assist them in appreciating the value of informal learning experiences for formal learning.

Lack of confidence as a student implies several specific conditions of learning which are summarized in Table 5.

Table 4
Conditions of Learning
Implied by Reaction Time

Instructional Events	Conditions of Learning	
	Diffused	Specific
Gaining Attention	Allow self-pacing* when possible.	
Informing the Learner of the Objective, or Choosing the Objective		Provide clear expectations related to accuracy, speed, size of chunk.
Stimulating Recall of Prerequisites		
Presenting the Stimulus		
Providing Learning Guidance		
Eliciting Performance		Provide clear instructions.* Emphasize accuracy rather than speed when possible. Allow time for accuracy.
Providing Feedback		Reinforce accuracy.* Reinforce increases in speed.*
Assessing Performance		Provide clear instructions. Emphasize accuracy rather than speed when possible. Allow time for accuracy
Enhancing Retention & Transfer		Provide experiences in anticipating potential surprises in different situations.

*Knox

Table 5
Conditions of Learning Implied by
Lack of Confidence as a Student

Instructional Events	Conditions of Learning
Gaining Attention	
Informing the Learner of the Objective, or Choosing the Objective	
Stimulating Recall of Prerequisites	Remind the learner that he has learned concepts & skills related to the learning at hand
Presenting the Stimulus	
Providing Learning Guidance	Suggest ways to study or practice.
Eliciting Performance	
Providing Feedback	Point out misperceptions.* Provide supportive comments for both correct and incorrect performance.
Assessing Performance	
Enhancing Retention & Transfer	

*Apps

Developing or Selecting Media

"Media are the physical means for presenting stimuli to the learner" (Briggs & Wager, 1981, p. 114), including books, charts, films, photographs, field trips, computer-assisted instruction, lectures, and discussion.

Gagne and Briggs (1979), and Briggs and Wager (1981), point out that learner characteristics are a factor in media selection. Gagne and Briggs state that agreement has not been reached on which characteristics are important, but that educators have posed characteristics such as learning style, reading ability, and family báckground (1979).

Knox (1977) states that the appropriateness of resources (media) for adults is dependent on such learner characteristics as interest in the topic, opportunity for application, level of education, and age. In addition, he states that the effectiveness of learning resources also depends on interests at different stages of adult development, memory, and pacing.

Vision. Apps (1981) describes vision as gradually declining from ages 18 to 40, sharply declining for many from ages 40 to 45, and less rapidly declining from age 45 up. After age 18, there is a slow decline in the ability to adapt to the dark, and the field of vision narrows somewhat. Ways to help adults compensate for age-related changes in vision (besides obtaining needed corrective lenses) should be considered in selecting, developing, and using media:

- Provide large, clearly produced visual materials (Apps, 1981).
- Make certain that light conditions are proper (Apps, 1981).
- Combine audio and visual presentation (Apps, 1981; Knox, 1977).
- Increase contrast by increasing illumination, reducing glare, closer seating, large type, and great contrast between type and background (Knox, 1977).
- Allow longer exposure time (Knox, 1977).
- Simplify sequences of information or exposure (Knox, 1977).
- Allow more time for adaptation between lighted and darkened surroundings (Knox, 1977).

Hearing. Knox (1977) states that ability to hear sounds gradually declines until the fifties, then impairments increase more rapidly. Pitch discrimination declines gradually between the twenties and fifties and then drops more abruptly. Apps (1981) states that as age increases, we hear more slowly and it takes longer to translate the meaning of sounds. "Older adults also have more difficulty screening out interfering noises" (Knox, 1977, p. 314).

Attention to changes in hearing should be considered in the selection, development, and use of media. Ways to help adult learners compensate for decline in hearing include the following:

- Enunciate clearly (Knox, 1977). Talk slowly and deliberately with sufficient volume (Apps, 1981).
- Provide sound amplification in a large room (Apps, p. 86).
- Face the group so nonverbal cues can be received (Apps, 1981), enabling use of facial and lip cues (Knox, 1977).
- Reduce background noise (Knox,

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1977).

Memory. Older adults can be given assistance in compensating for inadequacies in memory which result in difficulty with recalling and verbally expressing what has been learned (Knox, 1977).

- Use visual displays such as posters to evaluate learning (Knox, 1977)

Learning Strategies and Preferences. It is difficult for some adults to learn new ideas through reading, and easier for them to learn the same ideas from other media such as conversation or demonstration (Knox, 1977). Also, adults "tend to persist and learn better when they are able to use preferred resources" (Knox, 1977, p. 443).

- Accommodate their preferences by providing a variety of media or at least two media from which the learner can choose. Near the end of a lesson presented by a videodisc/microcomputer system for example, the learner is given a choice of two kinds of review—review of a short video segment illustrating the achievement of the purposes of an interview, or review of a list of the purposes to be achieved in an interview.

> "Compared to children, adults have *more* experiences; adults have *different kinds* of experiences; and adults' experiences are *organized differently*."

Cross (1979) reported that surveys have indicated that adults favor a variety in learning methods, with 75 to 80 percent favoring something other than lecture. She also reports that most adults prefer more interactive and action-oriented learning to passive, non-interactive learning; and, that it is believed that more active learning modes would be especially appealing to the educationally disadvantaged. Cross attributes this preference for active learning to the fact that adults usually want to be able to use the knowledge and skills they learn outside of the learning situation.

Experience. Knowles (1980) suggests that the use of experiential techniques such as group discussion, case studies, simulation, role-play, skill-practice experience, field projects, demonstrations, and seminars help adult learners use their individual experiences as well as those of others as resources for learning. Knox (1977) states that these kinds of learning experiences help the adult learner bring organized learning and personal experience together.

Assessing Student Performance

Kidd (1973) has indicated that self-assessment is important for adults, and that the adult learner needs guidance in how to go about such evaluation. In addition to evaluating planned learning, he suggests evaluating incidental learning.

Knowles has stated (rather strongly) a rationale for the use of self-assessment with adult learners:

> Nothing makes an adult feel more childlike than being judged by another adult; it is the ultimate sign of disrespect and dependency, as the one who is being judged experiences it. (1980, p. 49.)

He views self-evaluation as a mutual undertaking by the learner and instructor where the instructor serves as a role model by accepting feedback about himself and establishing a supportive atmosphere for self-evaluation. Also, the instructor has responsibility for involving learners in developing and carrying out "mutually acceptable criteria and methods" (Knowles, 1980, p. 58) for self-measurement of progress toward the learning objectives. Knowles suggests that in addition to performance tests and student products, adult learners can be evaluated using case studies and job performance records. He acknowledges that case studies are time consuming, however, the benefit is that effects of the learning experience on the whole person can be detected including changes in outlook, adjustment, and habits. He indicates that job performance records are especially appropriate for learning experiences related to professional performance.

Providing for self-evaluation can serve as a condition of learning for the instructional events, eliciting performance, providing feedback, and assessing performance. Case studies and job performance records could serve as media to implement these events.

Conclusion

The proposed integration of the characteristics of adult learners into the Gagne-Briggs model of instructional design has resulted in suggestions for components in each of the four stages of the lesson design process. These suggestions have been made to assist designers in developing effective lessons and materials for adult learners. Many areas for further investigation can be identified from the ideas presented here. The following list of questions proposes some areas for investigation which I have not addressed and which I believe merit further consideration.

1. Are there any differences in learning from experiences designed by the Gagne-Briggs model as opposed to experiences designed by the same model extended to account for the characteristics of adult learners? Specifically, what differences exist?

2. Which aspects of learning (cognitive, social, emotional, physical) are enhanced by attention to the characteristics of adult learners? For example: Does attention to adult learner characteristics increase positive attitudes toward learning; and, does this in turn facilitate achievement of the primary objectives of the instruction?

3. Which characteristics of adult learners should be considered in designing instruction for adults? Perhaps some or all of the characteristics presented in this paper should be given attention. Perhaps characteristics not addressed in this paper should be considered, such as time perception, decline in physical strength, and other characteristics. Which characteristics vary with culture, and how do they vary?

4. Which instructional events and conditions of learning derived from characteristics of adult learners are most effective for the different types of learning outcomes; and, which ones are applicable to all learning outcomes?

5. How do we go about analyzing characteristics of adult learners, such as experience, to determine how, when, and where to utilize these characteristics in designing learning experiences for adults?

6. How do we assist adult learners in such processes as unlearning and building cognitive structure?

7. How are other components of instructional systems design such as course organization, delivery systems, needs assessment, and formative evaluation

specifically affected by characteristics of adult learners?

It is my opinion that the Gagne-Briggs model of instructional design is a clear and useful model for designing instruction for adult learners of any age for any type of learning experience. It is limited, however, in that it is based on principles of learning and memory and does not consider other aspects of learning (social, emotional, physical) which may contribute to learning as a more than temporary change in behavior.

Attention to specific learner characteristics can extend the Gagne-Briggs design model to a more holistic view of learning, thus promoting more effective and efficient learning for adults.

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Resources/Index

Resources

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Books, Articles, and Position Papers

Module 1: A Systematic Approach to Instructional Development

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